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Unique	<a href="#">Stud- ies cover X-ray diffraction, thermal analysis TGA-DTA and lattice parameter analysis</a>	-
Unique	<a href="#">Perovskite crys- tal structure is Sebastian having a general for- mula ABO</a>	-
Unique	<a href="#">This structure is based on cubic each cube face having an oxygen atom</a>	-
Unique	<a href="#">Perovskite structure in the cubic phase (left) and tetragonal phase (right) (Chiang, 1997)</a>	-
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Unique	<a href="#">Piezoelectric and ferroelectric materials have a structure that is perovskite</a>	-
Unique	<a href="#">Another application is as a base for the manufacture of transducers</a>	-
Unique	<a href="#">X-ray diffraction is a test to determine the crystal system in materials</a>	-
Unique	<a href="#">XRD testing utilizing the diffraction of X- rays</a>	-

88 results	<a href="#">High voltage generator to function as power generating X-ray source in the x-ray tube</a>	<a href="#">youtube.com</a> <a href="#">patents.google.com</a> <a href="#">youtube.com</a> <a href="#">patents.google.com</a> <a href="#">linkedin.com</a> <a href="#">linkedin.com</a> <a href="#">facebook.com</a> <a href="#">chegg.com</a> <a href="#">amazon.com</a> <a href="#">freepatentsonline.com</a>
Unique	<a href="#">X-ray diffraction intensity captured by the detector and translated in the form of curves</a>	-
Unique	<a href="#">The analysis used in this study are as follows: (1) Thermal analysis</a>	-
Unique	<a href="#">Mixing is done using the Planetary Milling equipped with zirconia balls Figure</a>	-
Unique	<a href="#">Thermogravimetric analysis (TGA) can measure the change in weight of the sample</a>	-
Unique	<a href="#">The robust reaction method is a method for making ceramics made in the solid-state</a>	-
Unique	<a href="#">It occurs at temperatures above 1000°C</a>	-
Unique	<a href="#">In general, the solid-state reaction is stoichiometric reaction powders at high temperatures</a>	-
Unique	<a href="#">After the temperature over 750°C, there was found no decrease in mass</a>	-
Unique	<a href="#">The Figure shows that the single-phase already obtained</a>	-
Unique	<a href="#">ICSD data show that KNN orthorhombic crystal structure at room temperature</a>	-
Unique	<a href="#">Results KNN powder diffraction pattern at a calcination temperature of 700°C</a>	-
Unique	<a href="#">Flowchart synthesis <math>K_{0.5}Na_{0.5}NbO_3</math> Figure</a>	-
Unique	<a href="#">PTBIN-BATAN National Nuclear Energy Agency, 29-30</a>	-
1,230,000 results	<a href="#">Fundamentals of materials science and engineering</a>	<a href="#">amazon.com</a> <a href="#">amazon.com</a> <a href="#">wiley.com</a> <a href="#">bcs.wiley.com</a> <a href="#">chegg.com</a> <a href="#">bartleby.com</a> <a href="#">chegg.com</a> <a href="#">goodreads.com</a> <a href="#">ns1imaxhome.imax.com</a> <a href="#">docs.google.com</a>
Unique	<a href="#">Integrated approach: John Wiley &amp; Sons</a>	-
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Unique	<a href="#">Current Applied Physics, 1266-1271</a>	-

Unique	<a href="#">Surabaya: Indian Institute of Technology</a>	-
Unique	<a href="#">Ferroelectric materials and their applications in electronics circuits</a>	-
Unique	<a href="#">out the truth, XRD results need further analysis using the software Rietica smoothing method</a>	-
Unique	<a href="#">Journal of Applied Physics, 105</a>	-
Unique	<a href="#">Kumar, P., Pattanaik, P., &amp; Sonia</a>	-
65 results	<a href="#">Journal of Materials Science Indonesia, 452</a>	<a href="#">scilit.net</a> <a href="#">journalindonesia.org</a> <a href="#">youtube.com</a> <a href="#">youtube.com</a> <a href="#">sciencegate.app</a> <a href="#">journalindonesia.org</a> <a href="#">sciencegate.app</a> <a href="#">publons.com</a> <a href="#">202.70.136.141</a> <a href="#">piguno.com</a>
Unique	<a href="#">Suasmoro, ea, Pratapa, D., Hartanto, D., Setyoko, D., &amp; Dani,</a>	-
Unique	<a href="#">The characterization of mixed titanate Ba1- xSrxTiO3 phase formation from oxalate coprecipitated precursor</a>	-
Unique	<a href="#">Journal of European Ceramic Society, 309-314</a>	-
Unique	<a href="#">Retrieved 2 11, 2020, from ywcmatsci</a>	-
Unique	<a href="#">Surakarta: Eleven University in March</a>	-
Unique	<a href="#">Amalia Ma'rifatul Maghfiroh Department of Industrial Engineering, Bojonegoro University, Indonesia E-mail: amaliamarifatulmaghfiroh@gmail.com (Received: 30 December</a>	-
Unique	<a href="#">Accepted: 29 February 2020) ABSTRACT The structure of perovskite-based material contained in the niobate</a>	-
Unique	<a href="#">This material could store an electric charge, which was good because of the polarization</a>	-
Unique	<a href="#">Unleaded piezoelectric material, K 0,5 Na 0,5 NbO 3 (KNN), was synthesized using reliable</a>	-
Unique	<a href="#">Synthesis was done by first setting up K 2 CO 3 ; Na</a>	-
Unique	<a href="#">2 hours can produce a single-phase ABO 3 where A = (K, Na) and</a>	-
Unique	<a href="#">Orthorhombic perovskite structure KNN material owned by P4mm space group with lattice parameters</a>	-
Unique	<a href="#">Keywords: piezoelectric, perovskite, solid state, K 0,5 Na 0,5 NbO 3 INTRODUCTION Known perovskite</a>	-
Unique	<a href="#">It is known that niobate- based material has an advantage and a similar nature</a>	-
Unique	<a href="#">A at- oms occupy each corner of the cube while the atom B occupies</a>	-
Unique	<a href="#">The material has a perovskite structure that can have a lattice cube, tetragonal, orthorhombic,</a>	-

Unique	<a href="#">The ferroelectric material is one of several types of materials that have a role</a>	-
Unique	<a href="#">microwave, modular electro-optical, dielectric materials that are good for the capacitor, FeRAM (ferroelectric RAM), ferroelectric</a>	-
Unique	<a href="#">v6i1.7060 Gravity: Jurnal Ilmiah Penelitian dan Pembelajaran Fisika, 6(1), 2020, 8 Copyright © 2020, Gravity,</a>	-
Unique	<a href="#">Therefore, the content can store electrical charge properly — the electrical charge storage</a>	-
Unique	<a href="#">Polarization is the result of a cubic phase transition into a tetragonal phase</a>	-
Unique	<a href="#">So that the electric field is relatively small given cation would shift the central</a>	-
Unique	<a href="#">This polarization resulted in distortion of crystal that forms a dipole and the</a>	-
100 results	<a href="#">Ferroelectric has a high dielectric constant when applied to the field of relatively</a>	<a href="#">youtube.com</a> <a href="#">youtube.com</a> <a href="#">linkedin.com</a> <a href="#">link.springer.com</a> <a href="#">patents.google.com</a> <a href="#">amazon.com</a> <a href="#">cyberleninka.org</a> <a href="#">doubtnut.app</a> <a href="#">chegg.com</a> <a href="#">semanticscholar.org</a>
Unique	<a href="#">Therefore, the capacitor is made of a dielectric material with ferroelectric properties (Callister</a>	-
Unique	<a href="#">Piezoelectricity is a symptom when no force is applied to a material segment that</a>	-
Unique	<a href="#">A piezoelectric material can alter the mechanical stress into an electrical charge given to</a>	-
Unique	<a href="#">The piezoelectric material used as the material to produce electricity cantilever low-power mini</a>	-
Unique	<a href="#">The piezoelectric charge coefficient values are in the range of 1- 100 PC/N (Saito,</a>	-
Unique	<a href="#">Known piezoelectric materials today are PbZrTiO<sub>3</sub> (known as PZT), which are known to</a>	-
Unique	<a href="#">But the lead oxide is a toxic material that is high and will increase</a>	-
Unique	<a href="#">So that research must be done to make these unleaded piezoelectric material to</a>	-
Unique	<a href="#">perovskite crystal structure such as BaTiO<sub>3</sub> (BT), KNbO<sub>3</sub>, NaTaO<sub>3</sub></a>	-
Unique	<a href="#">According to research conducted by some experts, materials BiNaTiO<sub>3</sub> (BNT) is a good</a>	-
Unique	<a href="#">The amount of remnant polarization, namely BNT (<math>P_r</math>) = 38 <math>\mu\text{C}/\text{cm}</math></a>	-
Unique	<a href="#">But apparently, this BNT material still has shortcomings that made a dopant to improve</a>	-
Unique	<a href="#">K<sub>0.5</sub>Na<sub>0.5</sub>NbO<sub>3</sub> or commonly abbreviated as KNN is an excellent</a>	-
Unique	<a href="#">According to Saito (2004), a composition is having a high d<sub>31</sub> values</a>	-

99 results	<a href="#">KNN widely studied is a compound made of the carbonate such as K</a>	
Unique	<a href="#">KNN that have been hot press having d 33 ~ 160 pC/ N (Desmelinda,</a>	-
Unique	<a href="#">Analysis of the struc- ture and morphology of the piezoelectric ma- terial is performed</a>	-
Unique	<a href="#">structure, the difference in the ar- rangement of atoms in the crystal, the crystal is</a>	-
Unique	<a href="#">X-rays produce electrons spread if the particle strikes a metal at high speed in</a>	-
Unique	<a href="#">wavelengths have the distances between atoms is nearly equal or smaller in a glass (Zulianingsih,</a>	-
Unique	<a href="#">Samples that have been compressed powder form placed over a container that can be</a>	-
Unique	<a href="#">Then the X-ray beam strikes an example and is diffracted by the sample, into</a>	-
Unique	<a href="#">of 13 mm, a spatula, powder K<sub>2</sub>CO<sub>3</sub> , Na<sub>2</sub>CO<sub>3</sub></a>	-
Unique	<a href="#">each weighing 1,002 grams of K<sub>2</sub>CO<sub>3</sub> , 0.768 grams of Na</a>	-
Unique	<a href="#">included a zirconia balls and incorpo- rated for 1 hour at a rotation speed of</a>	-
Unique	<a href="#">rotary evaporator "VV Micro" (Heidolph) so that the alcohol is gone and keep equipment so</a>	-
Unique	<a href="#">And lastly, calcining the KNN powder at a temperature of 700 0 C for</a>	-
Unique	<a href="#">Thermal Analysis performed with TGA-DSC test to determine the calcination temperature of the ingredients</a>	-
Unique	<a href="#">From this test chart obtained in the form of mass change of heat so</a>	-
Unique	<a href="#">(2) Analysis Phase and Precur- sor Lattice parameters or materials that have been completed</a>	-
Unique	<a href="#">This test is used to look at any phase contained in the content that</a>	-
Unique	<a href="#">Data obtained in the form of the diffraction pattern when the material shot by</a>	-
Unique	<a href="#">The XRD pattern is the result of a comparison between the diffraction angle with</a>	-
Unique	<a href="#">From the results of these XRD characteristics are known and analyzed with match software</a>	-
Unique	<a href="#">This XRD test can also see the material lattice parameters by smoothing calculated and</a>	-
Unique	<a href="#">RESULTS AND DISCUSSION Results of KNN Powder Thermal Analysis Synthesis KNN (K<sub>0,5</sub>Na</a>	-
Unique	<a href="#">edu/xrd, 2020) In addition to analysis using X-ray diffrac- tion, testing the other is by</a>	-
Unique	<a href="#">Thermal analysis is the measurement of the physical properties and chemical as a function</a>	-

Unique	<a href="#">Thermal analysis has two analytical techniques that thermogravimetric analysis (TGA) and differential</a>	-
Unique	<a href="#">In contrast, the thermal differential analysis (DTA) can measure the temperature difference be-</a>	-
Unique	<a href="#">mination of the phase diagram, the phase transition polymeric, kinetic energy, heat capacity, enthalpy,</a>	-
Unique	<a href="#">Method with less solid-state synthesis is used to create a unique composition and morphology</a>	-
Unique	<a href="#">Keuntungan of this method is simple, in the sense that everyone can do</a>	-
Unique	<a href="#">Fisika, 6(1), 2020, 10 Copyright © 2020, Gravity, ISSN 2528-1976 in 99% alcohol for</a>	-
Unique	<a href="#">Then dried using a rotatory evaporator to obtain the KNN powder while maintaining the</a>	-
Unique	<a href="#">the presence of mass reduction and both endothermic and exothermic phenomena that accompany the specific</a>	-
91 results	<a href="#">650 o C to 750°C is possible because the CO 2 released from carbonate</a>	<a href="#">youtube.com</a> <a href="#">eric.ed.gov</a> <a href="#">hexion.com</a> <a href="#">linkedin.com</a> <a href="#">eric.ed.gov</a> <a href="#">hexion.com</a> <a href="#">quizlet.com</a> <a href="#">withinhours.com</a> <a href="#">repository.arizona.edu</a> <a href="#">researchgate.net</a>
Unique	<a href="#">From the results of the thermal analysis test it is believed that at</a>	-
95 results	<a href="#">at a temperature that is expected to form the KNN reaction at 700°C with</a>	<a href="#">youtube.com</a> <a href="#">youtube.com</a> <a href="#">facebook.com</a> <a href="#">facebook.com</a> <a href="#">chegg.com</a> <a href="#">chegg.com</a> <a href="#">coursehero.com</a> <a href="#">coursehero.com</a> <a href="#">legislature.mi.gov</a> <a href="#">gamefaqs.gamespot.com</a>
Unique	<a href="#">Then powder XRD results calcination testing to determine the phases present in the KNN</a>	-
Unique	<a href="#">Figure 5 is an XRD pattern of results from the software origin calcined at</a>	-
Unique	<a href="#">powder has been formed due to the phase generated only a single step</a>	-
Unique	<a href="#">To clarify the evidence that there is only a single phase of this material</a>	-
Unique	<a href="#">Figure 6 is a picture of mountains owned by KNN calcined material 700</a>	-
Unique	<a href="#">Determining the type of TiO2 phases are generated based on the location of the</a>	-
Unique	<a href="#">of powdered K2CO3, Nb2O5, NaCO3 and decreased mass at a temperature of around 100°C and</a>	-
Unique	<a href="#">Loss of mass that occurs at a temperature of about 100°C is a process</a>	-
Unique	<a href="#">This is because the drying process is not perfect, whereas when the temperature is</a>	-
Unique	<a href="#">Jurnal Ilmiah Penelitian dan Pembelajaran Fisika, 6(1), 2020, 11 Copyright © 2020, Gravity, ISSN 2528-1976</a>	-
Unique	<a href="#">to produce a single-phase ABO 3 where A = (K, Na) and B</a>	-

Unique	<a href="#">KNN material has a perovskite structure orthorhombic with P4mm space group and lattice parameters</a>	-
Unique	<a href="#">Piezoelectric Materials Synthesis and Characterization of Environmentally Friendly Bi0.5Na0.5TiO3-BaTiO2 (BNT-BT) For the Basic Materials</a>	-
Unique	<a href="#">Synthesis and Characterization of Ferroelectric Materials Lead-Free Electric 0.8 (Ka0.5Na0.5NbO3) -0.2 (Ba0.8Sr0.2TiO3) with the</a>	-
Unique	<a href="#">Results KNN powder diffraction pattern at a calcination temperature of 700°C Rietveld analysis is</a>	-
Unique	<a href="#">This method is carried out for the comminution process lattice parameters of the crystal</a>	-
Unique	<a href="#">KNN material, which has a structure orthorhombic with P4mm space group with lattice parameters</a>	-
Unique	<a href="#">so that the reliable reaction method with a composition that has been measured can be</a>	-
Unique	<a href="#">Gravity: Jurnal Ilmiah Penelitian dan Pembelajaran Fisika, 6(1), 2020, 12 Copyright © 2020, Gravity.</a>	-
Unique	<a href="#">The phase structure, dielectric properties, and relaxor behavior of (K0,5Na0,5) NbO3 - (Ba0,5Sr0,5) TiO3</a>	-
Unique	<a href="#">Synthesis and characterizations of KNN near 50/50 MPB ferroelectric López, A., Orayech, B.,</a>	-
Unique	<a href="#">Modexcrystallography analysis of the crystal structures and the low and high- temperature phase transitions</a>	-
Unique	<a href="#">Micro Structure Lead- Free Piezoelectric Materials Bismuth- Barium Titanate Sodium-Potassium Sodium Niobate Titanate Synthesis</a>	-
Unique	<a href="#">Analysis of Effect of Amount BZT Thin Films grown by Sol-Gel Method to the</a>	-

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Gravity: Jurnal Ilmiah Penelitian dan Pembelajaran Fisika, 6(1), 2020, 7 Copyright © 2020, Gravity, ISSN 2528-1976 Evaluation of thermal testing and X-ray diffraction of  $Ka_{0.5}Na_{0.5}NbO_3$  Amalia Ma'rifatul Maghfiroh\* Department of Industrial Engineering, Bojonegoro University, Indonesia \*E-mail: amaliamarifatulmaghfiroh@gmail.com (Received: 30 December 2019; Revised: 31 January 2020; Accepted: 29 February 2020) ABSTRACT The structure of perovskite-based material contained in the niobate and titanate. The fabric was a perovskite crystal structure having the formula  $ABO_3$ . **Ferroelectric and piezoelectric materials had a perovskite structure.** This material could store an electric charge, which was good because of the polarization resulting in a material that was a dielectric. Unleaded piezoelectric material,  $K_{0.5}Na_{0.5}NbO_3$  (KNN), was synthesized using reliable state methods. Synthesis was done by first setting up  $K_2CO_3$ ,  $Na_2CO_3$ , and  $Nb_2O_5$  as a base KNN system. Studies cover X-ray diffraction, thermal analysis TGA-DTA and lattice parameter analysis. From the TGA-DTA analysis obtained for KNN calcination temperature at  $700^\circ C$  for 2 hours can produce a single-phase  $ABO_3$  where  $A = (K, Na)$  and  $B = (Nb)$ . Orthorhombic perovskite structure KNN material owned by P4mm space group with lattice parameters  $a = 3.572 \text{ \AA}$ ;  $b = 3.570 \text{ \AA}$ ; and  $c = 3.565 \text{ \AA}$ . Keywords: piezoelectric, perovskite, solid state,  $K_{0.5}Na_{0.5}NbO_3$  INTRODUCTION Known perovskite structure-based material contained in the niobate and titanate (Desmelinda, 2015). It is known that niobate-based material has an advantage and a similar nature of PZT, but more environmentally friendly (Chen, et al., 2013). Perovskite crystal structure is Sebastian having a general formula  $ABO_3$ . This structure is based on cubic each cube face having an oxygen atom. A atoms occupy each corner of the cube while the atom B occupies the centre of the hub. The material has a perovskite structure that can have a lattice cube, tetragonal, orthorhombic, and others. The ferroelectric material is one of several types of materials that have a role in the world of science and industry. Examples of material utilization ferroelectric on electronic circuits such as: variation on the circuit microwave, modular electro-optical, dielectric materials are good for the capacitor, FERAM (ferroelectric RAM), ferroelectric tunnel junction, multiferroic materials, piezoelectric transducers, detectors pyroelectric, PTC Figure 1. Perovskite structure in the cubic phase (left) and tetragonal phase (right) (Chiang, 1997). Gravity: Jurnal Ilmiah Penelitian dan Pembelajaran Fisika <http://jurnal.untirta.ac.id/index.php/Gravity> ISSN: 244-515x; e-ISSN: 2528-1976 Vol. 6, No. 1, February 2020, Page 7-12 A B DOI: 10.30870/gravity.v6i1.7060 Gravity: Jurnal Ilmiah Penelitian dan Pembelajaran Fisika, 6(1), 2020, 8 Copyright © 2020, Gravity, ISSN 2528-1976 (positive temperature coefficient) and infrared sensors (Suasmoro et al., 2000 and Fu, 2009). Piezoelectric and ferroelectric materials have a structure that is perovskite. Therefore, the content can store electrical charge properly — the electrical charge storage due to the polarization of the material. Polarization is the result of a cubic phase transition into a tetragonal phase at a specific temperature, which is also called a Curie temperature. So that the electric field is relatively small given cation would shift the central grid due to Coulomb interaction. This polarization resulted in distortion of crystal that forms a dipole and the macroscopic scale separation of positive and negative charges or a dielectric material that is called. **Ferroelectric has a high dielectric constant when applied to the field of relatively low frequency**, for example, at room temperature,  $\epsilon_r$  to barium titanate of 5000. Therefore, the capacitor is made of a dielectric material with ferroelectric properties (Callister & Rethwisch, 2012). Piezoelectricity is a symptom when no force is applied to a material segment that causes the electric charge on the surface of the material sections. A piezoelectric material can alter the mechanical stress into an electrical charge given to him and change the electric field given to him becoming a mechanical stress. The piezoelectric material used as the material to produce electricity cantilever low-power mini electric motors, microphone and medical devices on ultrasonography (Ahda, 2012). Another application is as a base for the manufacture of transducers. The piezoelectric charge coefficient values are in the range of 1- 100 pC/N (Saito, 2004). Known piezoelectric materials today are  $PbZrTiO_3$  (known as PZT), which are known to have excellent piezoelectric properties and widely applied. But the lead oxide is a toxic material that is high and will increase the danger at high temperatures, especially in the calcining and sintering processes (Mardiyanto, 2010). So that research must be done to make these unleaded piezoelectric material to make it more environmentally friendly. In the general situation, the unleaded piezoelectric material is a material with a perovskite crystal structure such as  $BaTiO_3$  (BT),  $KNbO_3$ ,  $NaNbO_3$ , and non-perovskite include bismuth layer structured ferroelectric materials (BLSF) and tungsten-bronze ferroelectric materials. According to research conducted by some experts, materials  $BiNaTiO_3$  (BNT) is a good candidate to replace the PZT material. The amount of remnant polarization, namely  $BNT (P_r) = 38 \mu C/cm^2$  and  $E_c = 73 kV/cm$  (Ni et al, 2011). But apparently, this BNT material still has shortcomings that made a dopant to improve the performance of the piezoelectric material.  $Ka_{0.5}Na_{0.5}NbO_3$  or commonly abbreviated as KNN is an excellent candidate to make unleaded piezoelectric material for piezoelectric properties and a strong ferroelectric. According to Saito (2004), a composition is having a high d31 values obtained in the phase between orthorhombic and tetragonal. **KNN widely studied is a compound made of the carbonate such as  $K_2CO_3$ ,  $Na_2CO_3$ , and  $Nb_2O_5$** . KNN that have been hot press having  $d_{33} \sim 160 pC/N$  (Desmelinda, 2015). Analysis of the structure and morphology of the piezoelectric material is performed using X-ray diffraction (XRD). X-ray diffraction is a test to determine the crystal system in materials. This test also can explain the existence of the lattice parameters, the type of structure, the difference in the arrangement of atoms in the crystal, the crystal is not perfect, and the amorphous form in the material. X-rays produce electrons spread if the particle strikes a metal at high speed in a state of vacuum tubes. X-ray beam using a crystal to diffraction because of the order of X-ray wavelengths have the distances between atoms is nearly equal or smaller in a glass (Zulianingsih, 2012). XRD testing utilizing the diffraction of X-rays. **High voltage generator to function as power generating X-ray source in the x-ray tube.** Samples that have been compressed powder form placed over a container that can be positioned. Then the X-ray beam strikes an example and is diffracted by the sample, into the tube counter. X-ray diffraction intensity captured by the detector and translated in the form of curves. Gravity: Jurnal Ilmiah Penelitian dan Pembelajaran Fisika, 6(1), 2020, 9 Copyright © 2020, Gravity, ISSN 2528-1976 Furnace "Thermolyne" type F1500, and plate alumina crucible, mold pellet-shaped with a diameter of 13 mm, a spatula, powder  $K_2CO_3$ ,  $Na_2CO_3$ ,  $Nb_2O_5$  (Merck) and 99% alcohol. The first step in the synthesis of  $(K, Na)NbO_3$  is a powder, each weighing 1,002 grams of  $K_2CO_3$ , 0.768 grams of  $Na_2CO_3$ , and 3.854 grams of  $Nb_2O_5$ . Then the three powder is mixed with alcohol (99%) in a planetary milling, which included a zirconia balls and incorporated for 1 hour at a rotation speed of 150 rpm. The next process is to enter the material that has been mixed into the rotary evaporator "VV Micro" (Heidolph) so that the alcohol is gone and keep equipment so obtained homogeneous powders KNN. And lastly, calcining the KNN powder at a temperature of  $700^\circ C$  for 2 hours. The analysis used in this study are as follows: (1) Thermal analysis. Thermal Analysis performed with TGA-DSC test to determine the calcination temperature of the ingredients have been mixed. From this test chart obtained in the form of mass change of heat so it can know at what temperature the material has a constant mass. (2) Analysis Phase and Precursor Lattice parameters or materials that have been completed until calcination phase then testing X-Ray Diffraction. This test is used to look at any phase contained in the content that has been made. Data obtained in the form of the diffraction pattern when the material shot by the X-ray. The XRD pattern is the result of a comparison between the diffraction angle with high intensity. From the results of these XRD characteristics are known and analyzed with match software where the software already has a reference database and is matched with the test results. This XRD test can also see the material lattice parameters by smoothing calculated and measured patterns using Rietica software on the basis of the Rietveld method. RESULTS AND DISCUSSION Results of KNN Powder Thermal Analysis Synthesis KNN ( $K_{0.5}Na_{0.5}NbO_3$ ) was performed using a reliable reaction method (regular mixing). Mixing is done using the Planetary Milling equipped with zirconia balls Figure 2. XRD Work Scheme (Ywcmatsci.yale.edu/xrd, 2020) In addition to analysis using X-ray diffraction, testing the other is by thermal analysis. Thermal analysis is the measurement of the physical properties and chemical as a function of temperature. Thermal analysis has two analytical techniques that thermogravimetric analysis (TGA) and differential thermal (DTA). Thermogravimetric analysis (TGA) can measure the change in weight of the sample. In contrast, the thermal differential analysis (DTA) can measure the temperature difference between the sample with inert reference material as a function of temperature. DTA is used for the study of the structure of the glass, the determination of the phase diagram, the phase transition polymeric, kinetic energy, heat capacity, enthalpy, and decomposition. The robust reaction method is a method for making ceramics made in the solid-state. It occurs at temperatures above  $1000^\circ C$ . Method with less solid-state synthesis is used to create a unique composition and morphology needed to produce desirable properties in crystals, piezoelectric, and other advanced materials. In general, the solid-state reaction is stoichiometric reaction powders at high temperatures. Keuntungan of this method is simple, in the sense that everyone can do it, but it can be tricky, for instance, at a temperature and atmosphere used. RESEARCH METHODS Material Synthesis  $Ka_{0.5}Na_{0.5}NbO_3$  Equipment and materials used during material synthesis  $Ka_{0.5}Na_{0.5}NbO_3$  is O'haus PA214 digital scales, Laboratory planetary mill "Pulverisette 5" rotary evaporator "VV Micro", Gravity: Jurnal Ilmiah Penelitian dan Pembelajaran Fisika, 6(1), 2020, 10 Copyright © 2020, Gravity, ISSN 2528-1976 in 99% alcohol for 1 hour. Then dried using a rotary evaporator to obtain the KNN powder while maintaining the homogeneity of the mixture. Once it is done, thermal analysis (TGA-DTA) to determine the reactions indicated by the presence of mass reduction and both endothermic and exothermic phenomena that accompany the specific range of temperatures that can be known calcination temperature.  **$650^\circ C$  to  $750^\circ C$  is possible because the  $CO_2$  released from carbonate** of approximately 11.17%. After the temperature over  $750^\circ C$ , there was found no decrease in mass. From the results of the thermal analysis test it is believed that at temperatures around  $650^\circ C$  to  $750^\circ C$  the reaction occurs in the formation of KNN material. Test Results X-ray Diffraction After the thermal analysis is carried out, the powder mixture of  $K_2CO_3$ ,  $NaCO_3$  and  $Nb_2O_5$  is calcined **at a temperature that is expected to form the KNN reaction at  $700^\circ C$  with** a holding of 2 hours. Then powder XRD results calcination testing to determine the phases present in the KNN powder. Figure 5 is an XRD pattern of results from the software origin calcined at a temperature of  $700^\circ C$  for 2 hours. The results of the XRD pattern shows that when a temperature of  $700^\circ C$ , KNN powder has been formed due to the phase generated only a single step and no secondary phase. To clarify the evidence that there is only a single phase of this material can be analyzed using software match. Figure 6 is a picture of mountains owned by KNN calcined material  $700^\circ C$  for 2 hours. The Figure shows that the single-phase already obtained. Determining the type of  $TiO_2$  phases are generated based on the location of the summit accord angle ( $2\theta$ ) with an individual specific datasheet. ICSD data show that KNN orthorhombic crystal structure at room temperature. To find from Figure 4 the results of TGA-DTA is known that a mixture of powdered  $K_2CO_3$ ,  $Nb_2O_5$ ,  $NaCO_3$  and decreased mass at a temperature of around  $100^\circ C$  and  $650$  to  $750^\circ C$ . Loss of mass that occurs at a temperature of about  $100^\circ C$  is a process of evaporation of water, where the water is still in powder have been mixed. This is because the drying process is not perfect, whereas when the temperature is Figure 5. Results KNN powder diffraction pattern at a calcination temperature of  $700^\circ C$ . Figure 3. Flowchart synthesis  $Ka_{0.5}Na_{0.5}NbO_3$  Figure 4. The test results of TGA-DSC 50 mg  $Ka_{0.5}Na_{0.5}NbO_3$  Gravity: Jurnal Ilmiah Penelitian dan Pembelajaran Fisika, 6(1), 2020, 11 Copyright © 2020, Gravity, ISSN 2528-1976 CONCLUSION Perovskite structure without bimale material synthesized by reliable reaction method. Their calcination at a temperature of  $700^\circ C$  for 2 hours is able to produce a single-phase  $ABO_3$  where  $A = (K, Na)$  and  $B = (Nb)$ . KNN material has a perovskite structure orthorhombic with P4mm space group and lattice parameters  $a = 3.572 \text{ \AA}$ ;  $b = 3.570 \text{ \AA}$ ; and  $c = 3.565 \text{ \AA}$ . REFERENCES Ah, S. (2012). Piezoelectric Materials Synthesis and Characterization of Environmentally Friendly  $Bi_{0.5}Na_{0.5}TiO_3$ - $BaTiO_2$  (BNT-BT) For the Basic Materials Ultrasonic Transducer for Medical Diagnosis. PTBIN-BATAN National Nuclear Energy Agency, 29-30. Callister, W., & Rethwisch, D. 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Ferroelectric materials and their applications in electronics circuits. out the truth, XRD results need further analysis using the software Rietica smoothing method. Figure 6. Results KNN powder diffraction pattern at a calcination temperature of  $700^\circ C$  Rietveld analysis is a method for matching the measured diffraction pattern of research and obtained from the model. This method is carried out for the comminution process lattice parameters of the crystal structure of the material. Figure 7. Results refinement KNN material Figure 7 is the result of the refinement of the KNN material, which has a structure orthorhombic with P4mm space group with lattice parameters  $a = 3.572 \text{ \AA}$ ;  $b = 3.570 \text{ \AA}$ ; and  $c = 3.565 \text{ \AA}$ . In this figure, the data showed that between the ICSD with the results of the study have a lattice parameter value of less than  $4 \text{ \AA}$ , which means that research can be said to have been by the data ICSD and has a single-phase so that the reliable reaction method with a composition that has been measured can be used for further research analysis. Gravity: Jurnal Ilmiah Penelitian dan Pembelajaran Fisika, 6(1), 2020, 12 Copyright © 2020, Gravity, ISSN 2528-1976 Taiwan: National Central University Press. Hongliang, D., & et al. (2009). The phase structure, dielectric properties, and relaxor behavior of  $(K_{0.5}Na_{0.5})NbO_3$ - $(Ba_{0.5}Sr_{0.5})TiO_3$  solid, lead-free solution for high-temperature applications. Journal of Applied Physics, 105. Kumar, P., Pattanaik, P., & Sonia. (2013). Synthesis and characterizations of KNN near 50/50 MPB ferroelectric López, A., Orayech, B., & Faik. (2015). 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