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Answer the following in one or two sentences. What is enthalpy of fusion?Define enthalpy of fusion.Enthalpy change that occurs when one mole of a solid is converted into liquid without a change in temperature at constant pressure is the enthalpy of fusion.shaalaa.comEnthalpies of Physical Transformations Is there an error in this question or solution? The enthalpy of fusion, also known as the heat of fusion, is the amount of energy in the form of heat that is needed to change the state of a substance from a solid to a liquid at its melting point, without any change in temperature. It is a type of latent heat. It is usually expressed in Joules per mole (J/mol) or kilojoules per mole (kJ/mol). The enthalpy of fusion is a positive value because energy is required to break the bonds in the solid state. The formula to calculate the enthalpy of fusion is given by: @$\begin{align*} \Delta H = q/n \end{align*}@$ Where: ΔH is the enthalpy change (in J/mol or kJ/mol) q is the heat absorbed or released (in J or kJ) n is the number of moles (in mol) Know about Physics WallahPhysics Wallah is an Indian edtech platform that provides accessible & comprehensive learning experiences to students from Class 6th to postgraduate level. We also provide extensive NCERT solutions, sample paper, NEET, JEE Mains, BITSAT previous year papers & more such resources to students. Physics Wallah also caters to over 3.5 million registered students and over 78 lakh+ Youtube subscribers with 4.8 rating on its app.We Stand Out becauseWe provide students with intensive courses with India’s qualified & experienced faculties & mentors. PW strives to make the learning experience comprehensive and accessible for students of all sections of society. 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Apart from catering students preparing for JEE Mains and NEET, PW also provides study material for each state board like Uttar Pradesh, Bihar, and others In this article, you will learn about heat of fusion, including its thermodynamics and its applications. After this article, you will be able to understand the nature of heat of fusion as well as use it to solve thermochemistry problems. Heat of fusion, also called enthalpy of fusion or latent heat of fusion, is a quantity of energy needed to melt or freeze a substance under conditions of constant pressure. When studying chemistry, “fusion” simply has the same definition as melting. In the classroom, you mostly use heat of fusion when a substance is at its melting point or freezing point. In such cases, most think of heat of fusion as a constant. For instance, water has a heat of fusion of at its melting point of . This means that, at , one gram of liquid water must release 334 Joules of energy to completely freeze into ice. Also, one gram of ice must absorb 334 Joules of energy to completely melt at . You can calculate the amount of heat energy needed to change a substance’s phase at its melting point using the following heat of fusion equation: : Total change in heat energy (in Joules) : Heat of fusion of substance (in Joules per gram) : Mass of substance (in grams) If you know the molar mass of the substance, you can easily convert it into a molar heat of fusion. Water has a molar mass of , so its molar heat of fusion would be (). Consequently, to calculate the total change in energy, you would instead have to use moles instead of mass: Heat of fusion has interested chemists and physicists because it suggests that a substance can absorb or release energy without changing temperature. Indeed, when one mole of ice at absorbs 6020 Joules of heat, the resulting liquid water will also have a temperature of . To understand the peculiarity of this phenomenon, we first need to talk about energy changes that don’t involve a phase change. Typically, when a substance absorbs or releases heat energy, its temperature then changes in response. The amount of temperature change is governed by the substance’s specific heat, which is a quality intrinsic to a substance and does not depend on how much of the substance you have. The following equation details the relationship between heat energy, specific heat, and temperature. : Change in heat (in Joules) : Mass of the substance (in grams) : Specific heat of substance (in Joules per gram per degree Celsius) : Change in Temperature (in degrees Celsius) In this way, you can think of specific heat as the amount of energy needed to change one gram of a substance’s temperature by one degree Celsius. For instance, the specific heat of gold is . This means that one gram of pure gold heats by when it absorbs 0.128 Joules of energy. Conversely, when 0.128 Joules of energy are extracted from the gold, its temperature lowers by . To learn more about how to use specific heat, check out this article. Since temperature and heat have a directly proportional relationship, a heat versus temperature graph of a substance without phase changes is linear. When the graph includes phase changes, a strange-looking piecewise slope emerges with flat stretches that correspond to melting and vaporization. As a side note, the phase change between gas and liquid is governed by a “heat of vaporization” that functions identically to heat of fusion. Linear heating curve of a substance in one phase. The slope equals 1/(mC) Heating curve of a substance for all three phases. So, given that temperature and heat energy have a direct relationship usually, why does temperature not change during phase transitions? To understand why, we need to investigate the thermodynamics of phase transitions. First, we need to talk about what “temperature” really means. Chemists and physicists define temperature as the average kinetic energy per molecule of a substance. Kinetic energy depends on the mass and speed of a particle. Because heating a substance does not involve changes in molecular mass, only the speed of the molecules changes. Thus, when a substance absorbs heat energy, its molecules then move faster, indicating an increased temperature. Importantly, a system’s temperature is proportional to a quantity called the internal energy of the system. Thus, any changes to a system’s temperature will involve a similar change in its internal energy. The first law of thermodynamics states that any change in the internal energy of a system () equals the sum of heat given off or absorbed and work done by or on the system: : Internal energy; positive for increasing temperature, negative for decreasing temperature (in Joules) : Heat; positive for heat absorbed, negative for heat released (in Joules) : Work; positive for work done on the system, negative for work done by the system (in Joules Generally, when dealing with some substance in a vessel, the only work that the substance can perform is expansion or compression work. This involves the substance changing volume with or against an external pressure. However, only gases can perform substantial expansion or compression, and heat acts oppositely to maintain the gas’s internal energy. For instance, when heating a gas (positive heat), the gas will expand (negative work), resulting in no change in internal energy. Further, when compressing a gas (positive work), the gas will release heat energy (negative heat). Unlike gases, liquids and solids don’t change much in volume when heated or cooled. When a liquid or solid is heated or cooled, virtually no work is performed. Thus, any heat absorbed increases the substance’s internal energy, raising its temperature. Liquids and solids do experience nonzero work, however, when changing phases. This is because molecules are often closer together in solid form than in liquid form. As a result, a solid melting into a liquid must perform expansion, and a liquid must compress to solidify. This phenomenon precisely explains the nature of the heat of fusion. Once a solid is heated to its melting point, any further heat energy inputted into the solid is used to expand it into a liquid. Thus, the heat and work of the substance counteract each other, resulting in no change in internal energy, allowing the substance to stay at its melting point until it becomes entirely liquid. Heating curve of a substance for all three phases. Phase change lines indicate heat exchange without temperature change. Problem 1 How much energy does it take to convert of ice at into water at ? The specific heat of ice is and the specific heat of liquid water is . Problem 2 Rather than melt into liquid, solid CO2 (also known as dry ice) sublimates into gas under atmospheric pressure at . Appropriately, dry ice has a heat of sublimation of . You have a chemical reaction that will give off approximately , but you want to make sure it doesn’t get warmer than . What is the minimum number of grams of dry ice should you surround the reaction flask to keep it cold? (Hint: you’ll want enough dry ice to absorb all the heat through sublimation so that no heat is available to warm up the reaction). 1: 2: Share — copy and redistribute the material in any medium or format for any purpose, even commercially. Adapt — remix, transform, and build upon the material for any purpose, even commercially. The licensor cannot revoke these freedoms as long as you follow the license terms. Attribution — You must give appropriate credit , provide a link to the license, and indicate if changes were made . You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. ShareAlike — If you remix, transform, or build upon the material, you must distribute your contributions under the same license as the original. No additional restrictions — You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits. You do not have to comply with the license for elements of the material in the public domain or where your use is permitted by an applicable exception or limitation . No warranties are given. The license may not give you all of the permissions necessary for your intended use. For example, other rights such as publicity, privacy, or moral rights may limit how you use the material. Enthalpy change when a substance melts Enthalpies of melting and boiling for pure elements versus temperatures of transition, demonstrating Trouton's rule In thermodynamics, the enthalpy of fusion of a substance, also known as (latent) heat of fusion, is the change in its enthalpy resulting from providing energy, typically heat, to a specific quantity of the substance to change its state from a solid to a liquid, at constant pressure. The enthalpy of fusion is the amount of energy required to convert one mole of solid into liquid. For example, when melting 1 kg of ice (at 0 °C under a wide range of pressures), 333.55 kJ of energy is absorbed with no temperature change. The heat of solidification (when a substance changes from liquid to solid) is equal and opposite. This energy includes the contribution required to make room for any associated change in volume by displacing its environment against ambient pressure. The temperature at which the phase transition occurs is the melting point or the freezing point, according to context. By convention, the pressure is assumed to be 1 atm (101.325 kPa) unless otherwise specified. The enthalpy of fusion is a latent heat, because, while melting, the heat energy needed to change the substance from solid to liquid does not cause any increase in temperature. Temperature remains constant during the freezing or melting process, and only begins to change again (assuming the energy input or removal (cooling) continues) after the phase change is complete. The latent heat of fusion is the enthalpy change of any amount of substance when it melts. When the heat of fusion is referenced to a unit of mass, it is usually called the specific heat of fusion, while the molar heat of fusion refers to the enthalpy change per amount of substance in moles. The liquid phase has a higher internal energy than the solid phase. This means energy must be supplied to a solid in order to melt it and energy is released from a liquid when it freezes, because the molecules in the liquid experience weaker intermolecular forces and so have a higher potential energy (a kind of bond-dissociation energy for intermolecular forces). When liquid water is cooled, its temperature falls steadily until it drops just below the line of freezing point at 0 °C. The temperature then remains constant at the freezing point while the water crystallizes. Once the water is completely frozen, its temperature resumes a colder trend. The enthalpy of fusion is almost always a positive quantity; helium is the only known exception.[1] Helium-3 has a negative enthalpy of fusion at temperatures below 0.3 K. Helium-4 also has a very slightly negative enthalpy of fusion below 0.77 K (−272.380 °C). This means that, at appropriate constant pressures, these substances freeze with the addition of heat.[2] In the case of 4He, this pressure range is between 24.992 and 25.00 atm (2,533 kPa).[3] Standard enthalpy change of fusion of period threeStandard enthalpy change of fusion of period two of the periodic table of elements Substance Heat of fusion (cal/g) (J/g) water 79.72 333.55 methane 13.96 58.99 propane 19.11 79.96 glycerol 47.95 200.62 formic acid 66.05 276.35 acetic acid 45.90 192.09 acetone 23.42 97.99 benzene 30.45 127.40 myristic acid 47.49 198.70 palmitic acid 39.18 163.93 sodium acetate/H2O 63–69 264–289[4] sodium sulfate/H2O 61 254[5] stearic acid 47.54 198.91 gallium 19.2 80.4 paraffin wax (C25H52) 47.8–52.6 200–220 These values are mostly from the CRC Handbook of Chemistry and Physics, 62nd edition. The conversion between cal/g and J/g in the above table uses the thermochemical calorie (calth) = 4.184 joules rather than the International Steam Table calorie (calINT) = 4.1868 joules. To heat 1 kg of liquid water from 0 °C to 20 °C requires 83.6 kJ (see below). However, heating 0 °C ice to 20 °C requires additional energy to melt the ice. We can treat these two processes independently and using the specific heat capacity of water to be 4.18 J/(g·K); thus, to heat 1 kg of ice from 273.15 K to water at 293.15 K (0 °C to 20 °C) requires:(1) 333.55 J/g (heat of fusion of ice) = 333.55 kJ/kg = 333.55 kJ for 1 kg of ice to melt, plus(2) 4.18 J/(g·°C) × 20 °C = 4.18 kJ/(kg·°C) × 20 °C = 83.6 kJ for 1 kg of water to increase in temperature by 20 °C(1 + 2) 333.55 kJ + 83.6 kJ = 417.15 kJ for 1 kg of ice to increase in temperature by 20 °CSilicon has a heat of fusion of 50.21 kJ/mol. 50 kW of power can supply the energy required to melt about 100 kg of silicon in one hour:50 kW = 50kJ/s = 180000kJ/h180000kJ/h × (1 mol Si)/50.21kJ × 28gSi/(mol Si) × 1kgSi/1000gSi = 100.4kg/h The heat of fusion can also be used to predict solubility for solids in liquids. Provided an ideal solution is obtained the mole fraction (x 2) {\displaystyle (x_{2})} of solute at saturation is a function of the heat of fusion, the melting point of the solid (T fus) {\displaystyle (T_{\text{fus}})} and the temperature (T) {\displaystyle (T)} of the solution: ln x 2 = − Δ H fus ∘ R (1 T − 1 T fus) {\displaystyle \ln x_{2}=-{\frac {\Delta H_{\text{fus}}^{\circ }}{R}}\left({\frac {1}{T}}-{\frac {1}{T_{\text{fus}}}}\right)} Here, R {\displaystyle R} is the gas constant. For example, the solubility of paracetamol in water at 298 K is predicted to be: x 2 = exp [− 28100 J mol − 1 8.314 J K − 1 mol − 1 (1 298 K − 1 442 K)] = 0.0248 {\displaystyle x_{2}=\exp {\left[-{\frac {28100~{\text{J mol}}^{-1}}{8.314~{\text{J K}}^{-1}~{\text{mol}}^{-1}}}\left({\frac {1}{298~{\text{K}}}}-{\frac {1}{442~{\text{K}}}}\right)\right]}=0.0248} Since the molar mass of water and paracetamol are 18.0153gmol−1 and 151.17gmol−1 and the density of the solution is 1000gL−1, an estimate of the solubility in grams per liter is: 0.0248 × 1000 g L − 1 18.0153 g mol − 1 1 − 0.0248 × 151.17 g mol − 1 = 213.4 g L − 1 {\textstyle {\frac {0.0248\times {\frac {1000~{\text{g L}}}^{-1}}{18.0153~{\text{g mol}}^{-1}}}}{1-0.0248}\times 151.17~{\text{g mol}}^{-1}=213.4~{\text{g L}}^{-1}} 1000 g/L * (mol/18.0153g) is an estimate of the number of moles of molecules in 1L solution, using water density as a reference; 0.0248 * (1000 g/L * (mol/18.0153g)) is the molar fraction of substance in saturated solution with a unit of mol/L; 0.0248 * (1000 g/L * (mol/18.0153g)) * 151.17g/mol is the solute's molar fraction equivalent mass conversion; 1-0.0248 will be the fraction of the solution that is solvent. which is a deviation from the real solubility (240 g/L) of 11%. This error can be reduced when an additional heat capacity parameter is taken into account.[6] At equilibrium the chemical potentials for the solute in the solution and pure solid are identical: μ solid ∘ = μ solute ∘ {\displaystyle \mu _{\text{solid}}^{\circ }=\mu _{\text{solute}}^{\circ }\,} or μ solid ∘ = μ liquid ∘ + R T ln X 2 {\displaystyle \mu _{\text{solid}}^{\circ }=\mu _{\text{liquid}}^{\circ }+RT\ln X_{2}\,} with R {\displaystyle R\,} the gas constant and T {\displaystyle T\,} the temperature. Rearranging gives: R T ln X 2 = − (μ liquid ∘ − μ solid ∘) {\displaystyle RT\ln X_{2}=-\left(\mu _{\text{liquid}}^{\circ }-\mu _{\text{solid}}^{\circ }\right)\,} and since Δ G fus ∘ = μ liquid ∘ − μ solid ∘ {\displaystyle \Delta G_{\text{fus}}^{\circ }=\mu _{\text{liquid}}^{\circ }-\mu _{\text{solid}}^{\circ }\,} the heat of fusion being the difference in chemical potential between the pure liquid and the pure solid, it follows that R T ln X 2 = − (Δ G fus ∘) {\displaystyle RT\ln X_{2}=-\left(\Delta G_{\text{fus}}^{\circ }\right)\,} Application of the Gibbs–Helmholtz equation: (∂ (Δ G fus ∘ T) ∂ T) p = − Δ H fus ∘ T 2 {\displaystyle \left({\frac {\partial \left({\frac {\Delta G_{\text{fus}}^{\circ }}{T}}\right)}{\partial T}}\right)_{p\,}=-{\frac {\Delta H_{\text{fus}}^{\circ }}{T^{2}}}} ultimately gives: (∂ (ln X 2) ∂ T) = Δ H fus ∘ R T 2 {\displaystyle \left({\frac {\partial \left(\ln X_{2}\right)}{\partial T}}\right)={\frac {\Delta H_{\text{fus}}^{\circ }}{RT^{2}}}} or: ∂ ln X 2 = Δ H fus ∘ R T 2 × δ T {\displaystyle \partial \ln X_{2}={\frac {\Delta H_{\text{fus}}^{\circ }}{RT^{2}}}\times \delta T} and with integration: ∫ X 2 = 1 X 2 = x 2 δ ln X 2 = ln x 2 = ∫ T fus T Δ H fus ∘ R T 2 × Δ T {\displaystyle \int _{X_{2}=1}^{X_{2}=x_{2}}\delta \ln X_{2}=\ln x_{2}=\int _{T_{\text{fus}}}^{T}{\frac {\Delta H_{\text{fus}}^{\circ }}{RT^{2}}}\times \Delta T} the result is obtained: ln x 2 = − Δ H fus ∘ R (1 T − 1 T fus) {\displaystyle \ln x_{2}=-{\frac {\Delta H_{\text{fus}}^{\circ }}{R}}\left({\frac {1}{T}}-{\frac {1}{T_{\text{fus}}}}\right)} Enthalpy of vaporization Heat capacity Thermodynamic databases for pure substances Joback method (Estimation of the heat of fusion from molecular structure) Latent heat Lattice energy Heat of dilution ^ Atkins & Jones 2008, p. 236. ^ Ott & Boerio-Goates 2000, pp. 92–93. ^ Hoffer, J. 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Atkins, Peter; Jones, Loretta (2008), Chemical Principles: The Quest for Insight (4th ed.), W. H. Freeman and Company, p. 236, ISBN 978-0-7167-7355-9 Ott, BJ. Bevan; Boerio-Goates, Juliana (2000), Chemical Thermodynamics: Advanced Applications, Academic Press, ISBN 0-12-530985-6 Retrieved from " The enthalpy of fusion is a scientific term for the amount of energy a substance needs to absorb to change from a solid to a liquid. Think of it like this: when ice melts into water, it needs to take in heat, even if its temperature stays the same at 0°C. This extra energy is the enthalpy of fusion. It's the hidden energy that makes melting happen! What is Enthalpy of Fusion? When a solid turns into a liquid, it needs a special amount of heat energy. This energy is called the enthalpy of fusion. It's the energy required to break the bonds holding the solid together, allowing it to become a liquid. The interesting part is that during this change, the substance's temperature does not go up. How Does Melting Energy Work? Imagine you have an ice cube at 0°C. If you add heat to it, the ice starts to melt into water, but the water also stays at 0°C. Where does the heat go? It doesn't make the ice or water hotter. Instead, this heat energy is used to change the ice's state from solid to liquid. It helps break the strong connections between the water molecules in the ice. Once all the ice has melted, then any more heat added will start to make the water's temperature rise. Why is it Important? Understanding the enthalpy of fusion helps scientists and engineers in many ways. For example, it's important for: Keeping things cool: Ice is great for cooling drinks because it absorbs a lot of heat as it melts, keeping the drink cold for a long time. Making materials: When metals are melted down to be shaped, knowing their enthalpy of fusion helps figure out how much energy is needed. Weather and climate: The melting and freezing of ice and snow play a big role in Earth's weather patterns and how much energy is stored in the environment. Different Substances, Different Energies Every substance has its own unique enthalpy of fusion. For example, the energy needed to melt a kilogram of ice is different from the energy needed to melt a kilogram of iron. Substances with stronger bonds between their particles usually need more energy to melt. Related pages Images for kids Standard enthalpy change of fusion of period three See also In Spanish: Entalpía de fusión para niños The heat of fusion is the enthalpy change when a unit mass of a substance changes its state from solid to liquid at a constant temperature and pressure. It is sometimes called enthalpy of fusion or latent heat of fusion. The process of going from solid to liquid is known as melting, and the temperature at which it occurs is called the melting point [1-4]. Melting is an endothermic process since the substance absorbs heat during the phase change. A well-known example of melting is ice turning into water. Heat of Fusion Behavior at the macroscopic scale dictates that energy must be supplied to a substance to melt. The bonds connecting the atoms or molecules in a crystalline lattice break at the microscopic level. Thus, the molecules are separated and become disordered. Latent heat arises from work done to overcome intermolecular forces. The energy required to melt a solid and the temperature at which it occurs depend on the crystalline structure and the magnitude of the intermolecular forces [1-4]. Consider m grams of a solid that requires q Joules of energy to change its state completely from solid to liquid. Then, the heat of fusion (ΔHfus) is given by the following formula [1-4]: ΔHfus = q/m Symbol: ΔHfus Unit: Joules/gram (J/g), kiloJoules/kilogram (kJ/kg), or calories/gram (cal/g) The change in enthalpy when one mole of a substance undergoes a phase change from solid to liquid is called the molar heat of fusion or molar enthalpy of fusion. Let us calculate the molar heat of fusion for water from the heat of fusion [5]. Heat of fusion = 333.55 kJ/kg Molar mass of water = 18.015 g or 18.015 x 10-3 kg/mol Molar heat of fusion = 333.55 kJ/1 kg x 18.015 x 10-3 kg/mol = 6 kJ/mol H2O (s, ice) → H2O (l, water) ΔHfus= 6 kJ/mol The following table gives the molar heat of fusion of various substances [1]. SubstanceFormulaMelting Point, TM (K)Molar Heat of Fusion, ΔHfus (kJ/mol)NeonNe240.33OxygenO2540.44MethaneCH490.70.94EthaneC2H6902.85ChlorineCl2172.26.4Carbon tetrachlorideCCl42502.67WaterH2O273.156.00MercuryHg2342.3n-NonaneC9H2035319.3 The opposite of melting is freezing or solidification. Here, heat is extracted from the liquid to convert it into a solid. The molecules come closer and become more ordered. The heat liberated by a unit mass of a substance is called heat (enthalpy) of solidification. Solidification is an exothermic process [1-4]. Problem 1: How much heat is required to melt 10 g of ice at its melting point? Solution To calculate the heat (q) required to melt m grams of a liquid, we use the following formula: q = m ΔHfus Given, m = 10 g and ΔHfus = 333.55 J/g q = 10 g x 333.55 J/g = 3335.5 J or 3.34 kJ Problem 2: What mass of water will be melted at 0 ˚C if 1200 J of heat energy is applied? Solution We use the following formula: q = m ΔHfus Given, q = 1200 J and ΔHfus = 333.55 J/g Therefore, m = q/ΔHfus = 1200 J/ 333.55 Jg-1 = 3.6 g Q.1. Why is the heat of vaporization higher than fusion? Ans. The latent heat of vaporization is higher than fusion because it takes much energy to separate the molecules and vaporize the substance. Once the molecules are entirely separated, the gas expands and occupies ample space. What is Latent Heat of Fusion? Latent heat of fusion, also known as enthalpy of fusion, is the amount of energy that must be supplied to a solid substance (typically in the form of heat) in order to trigger a change in its physical state and convert it into a liquid (when the pressure of the environment is kept constant). For example, the latent heat of fusion of one kilogram of water, which is the amount of heat energy that must be supplied to convert 1 kg of ice without changing the temperature of the environment (which is kept at zero degrees celsius) is 333.55 kilojoules. It can be noted that the opposite of latent heat of fusion is the heat of solidification, which is the amount of energy that must be supplied to a liquid in order to facilitate a phase change and the conversion of the liquid into a solid. It can also be noted that the value of the heat of solidification of a substance is always equal in magnitude to the latent heat of fusion but always bears an opposite sign. For example, the amount of energy absorbed by ice to become water is equal to the amount of energy liberated by water to become ice. The latent heat of fusion of a substance also accounts for the energy required to accommodate any increase in the volume of the substance post the change of its physical state. The temperature at which the substance undergoes the phase transition is called the melting point of the substance. This temperature point can also be referred to as the freezing point of the substance when the heat of solidification is being considered. Unless specified to be otherwise, the pressure of the environment (when expressing the latent heat of fusion of a substance) is always assumed to be 1 atmosphere of pressure (which is roughly equal to 101.325 kilopascals). Specific Heat of Fusion and Molar Heat of Fusion Enthalpy of fusion is considered synonymous with the latent heat of fusion because the melting of a solid under normal atmospheric pressure usually requires energy in the form of heat. Therefore, the latent heat of fusion of a substance can be defined as the change in the enthalpy of a substance when it undergoes a phase transition from the solid phase to the liquid phase. If unit mass of the substance is considered, the energy required to convert it into a liquid under constant pressure is called the specific heat of fusion for the substance. If the change in enthalpy is calculated on a per-mole basis, the latent heat of fusion is referred to as the molar heat of fusion of the substance. Since the liquid phase has a higher internal energy associated with it than the solid-state, some positive amount of energy must be supplied to a given solid to facilitate the melting of the solid. Similarly, some positive magnitude of energy is released by almost all liquids when they become solids. This can be explained by the fact that the particles or molecules that constitute liquids have very high potential energies due to the fact that they are held together by relatively weak intermolecular forces. Therefore, the energy required to dissociate the intermolecular forces of attraction between the liquid particles is also relatively lower when compared to solids. An example of the latent heat of solidification can be observed in the cooling of water. When water, initially kept in the liquid state, is cooled to temperatures below zero degrees celsius, the temperature of the liquid water steadily drops until it approaches 0oC. At this temperature, the water undergoes crystallization and becomes a solid. Once the water is completely frozen, the temperature of the solid continues to drop below zero degrees celsius as it is cooled further. The latent heat of fusion of a solid is almost always positive in value. One of the few known exceptions to this is the element helium. Below temperatures of 0.3K (at temperatures approaching absolute zero), the helium-3 isotope has a negative value for the latent heat of fusion. To learn more about the latent heat of fusion and other important topics in chemistry, register with BYJU’S and download the mobile application on your smartphone. Put your understanding of this concept to test by answering a few MCQs. Click ‘Start Quiz’ to begin! Select the correct answer and click on the “Finish” buttonCheck your score and answers at the end of the quiz Visit BYJU’S for all Chemistry related queries and study materials 0 out of 0 arewrong 0 out of 0 are correct 0 out of 0 are Unattempted View Quiz Answers and Analysis

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