Melting and Boiling Point Chemistry Questions with Solutions

Q1: What is the melting point of mercury?
a) 357°C
b) -39°C
c) 0°C
d) 100°C

Answer: b) -39°C

Explanation: Mercury has a melting and freezing point of 234.32 kelvins (−38.83°C or −37.89°F).

Q2: Select the correct statement from the following options.
a) The transformation of solid to liquid is called melting and the reverse process is called freezing
b) The transformation of solid to liquid is called freezing and the reverse process is called melting
c) The transformation of liquid to solid is called melting and the reverse process is called freezing
d) None of the mentioned

Answer: a) The transformation of solid to liquid is called melting and the reverse process is called freezing

Q3: Select the incorrect statement from the following option.
a) Every pure solid crystalline substance has a characteristic and unique melting point
b) Impure sample of substance has different melting point
c) Two different pure substances have same melting points
d) Melting point serves as the criteria of purity of a solid substance

Answer: c) Two different pure substances have same melting points

Explanation: The melting points of two different pure substances are different. All of the other options are correct. Every pure solid crystalline substance has a unique melting point, but impure samples of the same substance have different melting points. The melting point of a solid substance is used to determine its purity.

Q4: When the solid and liquid phase are in equilibrium, the temperature _____
a) Increases gradually
b) Decreases gradually
c) Remains constant
d) None of the mentioned

Answer: c) Remains constant

Explanation: The temperature remains constant while the solid and liquid phases are in equilibrium. There is no temperature change since the heat is absorbed when changing states.

Q5: Molar heat of fusion is defined as _____
a) Energy required to melt one gram of solid
b) Energy required to melt one mole of solid
c) Energy required to melt one kilogram of solid
d) Energy required to melt ten moles of solid

Answer: b) Energy required to melt one mole of solid

Explanation: The energy required to melt one mole of solid at a particular temperature is known as molar heat of fusion. The enthalpy change per mole of substance is referred to as the molar heat of fusion.

Q6: The temperature remains constant during phase change because the increased kinetic energy is used to overcome the cohesive forces in the liquid.
a) True
b) False

Answer: a) True

Explanation: Because the increased kinetic energy is used to overcome the cohesive forces in the liquid, the temperature remains constant throughout phase shift. There is no temperature change since the heat is absorbed when changing states.

Q7: Why does ice have a sharp melting point but glass melts over a range of temperatures?

Answer:

Amorphous materials melt over a wide range of temperatures, whereas crystalline solids melt over a narrow range of temperatures. Thus, ice has a sharp melting point, indicating that it is a crystalline solid, but glass is an amorphous solid, melting over a wide range of temperatures.

Q8: Explain the principle of Melting Point Determination.

Answer:

Melting Point Determination Principle:

The melting point can be determined in various ways, each corresponding to a particular quantity of solid fat remaining.

The temperature at which fat is heated at a given rate becomes completely clear, and liquid in a one-end closed capillary tube is known as the capillary tube melting point, the complete melting point or clear point.

The slip melting point is measured at the temperature at which a column of fat moves in an open capillary when heated, comparable to the capillary tube method.

Q9: What is the importance of the melting point of solid or boiling point of liquid?

Answer:

(a) A solid's melting point or a liquid's boiling point indicate the intensity of the attraction forces between its particles.

(b) The melting or boiling point of a substance is a test of purity, as very pure substances have set shapes, melting and boiling points.

Q10: Why is liquid paraffin used in determination of boiling point?

Answer:

For the following reason, paraffin oil is used to determine the boiling point and melting point: it has a very high boiling point, which allows it to be used to maintain high temperatures in the boiling and melting point apparatus without losing the substance.

Q11: Covalent compounds have low melting and boiling point. Why?

Answer:

Due to the weak van der Waal's forces, covalent compounds have a low melting point, requiring less energy to break the bonding force. As a result, the melting and boiling points of covalent compounds are low.

- Covalent compounds are typically soft and malleable.
- They are not electrically conductive.
- They have lower fusion and vaporisation enthalpies.
- Ionic molecules are more flammable than covalent compounds.
- Covalent compounds are insoluble in water.

Q12: What is Latent Heat of Fusion?

Answer:

The amount of energy that must be supplied to a solid substance (usually in the form of heat) in order to cause a change in its physical state and convert it into a liquid is known as latent heat of fusion (when the pressure of the environment is kept constant).

For example, the latent heat of fusion of one kilogram of water is 333.55 kilojoules, which is the amount of heat energy required to transform one kilogram of ice without affecting the environment's temperature (which is held at zero degrees Celsius).

The energy necessary to accommodate any increase in the volume of a substance following a change in its physical state is accounted for by its latent heat of fusion. The melting point of a substance is the temperature at which it transitions from one phase to another. When considering the heat of solidification, this temperature point can also be referred to as the substance's freezing point.

Q13: At its melting point ice is lighter than water because

(A) H_2O molecules are more closely packed in solid state
(B) Ice crystals have hollow hexagonal arrangement of H_2O molecules
(C) On melting of ice the H_2O molecule shrinks in size
(D) Ice forms mostly heavy water on first melting

Answer:

H_2O molecules are arranged in a hollow hexagonal configuration in ice crystals.

Each H_2O molecule in ice is surrounded by three other H_2O molecules in a hexagonal honeycomb pattern. Each molecule in water is randomly surrounded by four neighbouring molecules, resulting in an open cage-like shape. As a result, there are many holes or open places.

A smaller number of molecules per ml is packed in this structure. A high number of hydrogen bonds are disrupted when ice melts. As a result, the molecules move into the holes or open spaces, bringing them closer together than in the solid form. As a result, the density increases exponentially. As a result, ice is denser than water.

So, the correct option is (B).

Q14: What is the relationship between Atomic Number and Boiling Point?

Answer:

- Because the number of electrons and the radius of the atom grow as you go down the group, the boiling points rise. The greater the number of electrons and the greater the distance over which they may move, the more temporary dipoles are possible, and hence the greater the dispersion forces.

- Additionally, when there are more electrons surrounding the nucleus, a stronger negatively-charged force is created. As the forces become stronger, the boiling point rises. Nonmetals often have low boiling points.

Q15: Two liquids (P) and (Q) can be separated by the method of fractional distillation. The boiling points of P and Q are _____ and _____ respectively.

(A) 329 K and 332 K

(B) 329 K and 354 K

(C) 329 K and 373 K

(D) 329 K and 473 K

Answer:

The difference between the boiling points in a fractional distillation process should be lesser than 25°C or 45°F. A simple distillation procedure is utilised when the difference between the boiling points is higher than 25°C.

As a result, P and Q have boiling temperatures of 329 K and 332 K, respectively. The difference in this case is 3K, which is less than 25 K.

So, the Correct Answer is (A) 329 K and 332 K.

Practise Questions on Melting and Boiling Point

Q1: The purity of the compound is confirmed by _____
a) Its melting point and boiling point
b) Chromatographic technique
c) Spectroscopy
d) All of the mentioned

Answer: d) All of the mentioned

Explanation: The melting and boiling points of the substance, as well as chromatographic techniques and spectroscopy, all indicate its purity.

Q2: What is the molar heat of fusion (kJ/mol) of water?
a) 1.3
b) 0.84

c) 7.61
d) 6.01

Answer: d) 6.01

Explanation: Water has a molar heat of fusion of 6.01 kJ/mol. The enthalpy change per mole of substance is referred to as the molar heat of fusion.

Q3: What produces more severe burns, boiling water or steam?

Anwer:

Burns from steam are more severe than those from boiling water. We know that the temperature of both boiling water and steam is roughly 100°C, yet steam produces serious burns.

- Boiling water has less energy than steam. It also has the latent heat of vaporisation.
- When steam condenses to form water on the skin, it produces 22.5×10^5 J/kg more heat than boiling water at the same temperature.
- Boiling water has less energy than steam. As a result, steam burns are more severe than those caused by boiling water.

Q4: If the non-volatile impurities contaminate the liquid, its boiling point gets _____
a) Depressed
b) Elevated
c) Remains same
d) None of the mentioned

Answer: b) Elevated

Explanation: If the liquid is contaminated with non-volatile contaminants, the boiling point increases. One of the most essential colligative properties is this. For instance, pure water boils at a lower temperature than salt water.

Q5: The boiling point and molar heat of vaporisation is dependent on _____
a) Strength of the intermolecular forces
b) Composition of the liquid compound
c) Size of the molecules
d) All of the mentioned

Answer: a) Strength of the intermolecular forces

Explanation: The strength of intermolecular forces determines the boiling point and molar heat of vaporisation. The boiling point of a liquid is affected by the surrounding environmental pressure.