# Resources



## Self Assessment A

### Question 1

Argon atoms do not combine to form species such as $Ar_2$, yet argon atoms do attract one another weakly through:

- **A)** dipole-dipole forces
- **B)** dipole-induced dipole forces
- **C)** ion-dipole forces
- **D)** dispersion forces
- **E)** hydrogen bonding

### Question 2

Which of the following substances is not likely to exhibit hydrogen bonding?

- **A)** $CH_3CH_2OH$
- **B)** $CH_3NH_2$
- **C)** $HOCH_2CH_2OH$
- **D)** $(CH_3)_3N$
- **E)** $NH_2OH$

### Question 3

Which of the following liquids would have the highest viscosity at $25^oC$?

- **A)** $HOCH_2CH_2OH$
- **B)** $CH_3CH_2OH$
- **C)** $CH_3CH_2Cl$
- **D)** $CH_3COOCH_3$
- **E)** $CH_3CH_2OCH_2CH_3$

### Question 4

Lithium metal has a body-centered cubic unit cell. How many lithium atoms are there in one unit cell?

- **A)** 1
- **B)** 2
- **C)** 3
- **D)** 4
- **E)** 8

### Question 5

Osmium tetraoxide, $OsO_4$ is a molecular crystal. Which of the following general properties would you NOT expect it to possess:

- **A)** being a poor conductor of electricity
- **B)** having soft rather than brittle crystals
- **C)** having a melting point around $40^oC$
- **D)** having a melting point around $1600^oC$

### Question 6

Which of the following substances should have the highest heat of vaporization?

- **A)** $H_2O$
- **B)** $H_2S$
- **C)** $C_6H_6$
- **D)** $CH_3OH$
- **E)** $CH_3OCH_3$

### Question 7

Which of the following gases would have the highest critical temperature?

- **A)** $NH_3$
- **B)** $CH_3OH$
- **C)** $H_2$
- **D)** $C_6H_6$
- **E)** $H_2O$

### Question 8

How much energy (heat) is required to convert 248 g of water from 0°C to 154°C? Assume that the water begins as a liquid, that the specific heat of water is 4.184 J/g.°C over the entire liquid range, that the specific heat of steam is 1.99 J/g.°C, and the heat of vaporization of water is 40.79 kJ/mol.

- **A)** 562 kJ
- **B)** 130 kJ
- **C)** 692 kJ
- **D)** 589 kJ
- **E)** 639 kJ

### Question 9

Diethyl ether has a heat of fusion of 6.90 kJ/mol and a heat of vaporization of 26.0 kJ/mol. Estimate the heat of sublimation of diethyl ether.

- **A)** -32.9 kJ/mol
- **B)** +32.9 kJ/mol
- **C)** -19.1 kJ/mol
- **D)** +19.1 kJ/mol
- **E)** The heat of sublimation can't be estimated from the data given.

### Question 10

Between 20 and 80°C, the enthalpy of vaporization of benzene is 31.0 kJ/mol. At 26°C, the vapor pressure of benzene is 100 torr. Calculate the vapor pressure of benzene at 45°C. R = 8.314 J/K·mol.

- **A)** 18.1 torr
- **B)** 633 torr
- **C)** 47.6 torr
- **D)** 211 torr
- **E)** None of the above

### Question 11

Which of the following in incorrectly paired?

- **A)** ionic crystals; cesium chloride
- **B)** covalent crystals; diamond
- **C)** molecular crystals; ice; sucrose
- **D)** metallic crystals; sodium chloride

### Question 12

Which substance would have the higher normal boiling point?

- **A)** $CH_4$
- **B)** $SiH_4$

### Question 13

If the atomic radius of a calcium crystal is 180 pm, what is the length of the edge of the unit cell?

- **A)** 509 pm
- **B)** 552 pm
- **C)** 600 pm
- **D)** 624 pm

### Question 14

Naphthalene sublimes at room temperature and 1 atmosphere pressure; which statement is true concerning the triple point of naphthalene?

- **A)** The triple point is lower than room temperature.
- **B)** The triple point is higher than room temperature.
- **C)** The triple point is equal to room temperature.

### Question 15

Which of the following statements is false?

- **A)** Phase change; energy (heat) is removed or added.
- **B)** Amorphous solids; lack a regular three-dimensional atomic arrangement.
- **C)** Molar heat of vaporization; energy required to vaporize one mole of a liquid.
- **D)** Critical temperature; regardless of the amount of pressure applied, the substance is a gas.