HOMEWORK QUESTİONS

1) *Heat* is

A) a measure of temperature.

B) a measure of the change in temperature.

C) a measure of thermal energy.

D) a measure of thermal energy transferred between two bodies at different temperature.

2) An endothermic reaction causes the surroundings to

A) warm up.

B) decrease in temperature.

C) become acidic.

D) release CO_2.

E) condense

3) Which of the following has a $\Delta H°_f = 0$ kJ/mol?

A) $CO_2(g)$

B) $O_3(g)$

C) $Cl^-(aq)$

D) $NH_3(aq)$

E) $I_2(s)$

4) Concerning the reaction

$$C(\text{graphite}) + O_2(g) \rightarrow CO_2(g) \qquad \Delta H° = -393 \text{ kJ/mol}$$

how many grams of C(graphite) must be burned to release 275 kJ of heat?

A) 0.70 g

B) 8.40 g

C) 12.0 g

D) 17.1 g

E) 22.3 g

5) For which of these reactions will the difference between $\Delta H°$ and $\Delta E°$ be the greatest?

A) $2\ H_2O_2(l) \rightarrow 2\ H_2O(l) + O_2(g)$

B) $CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$

C) $NO(g) + O_3(g) \rightarrow NO_2(g) + O_2(g)$

D) $2\ C_2H_6(g) + 7\ O_2(g) \rightarrow 4\ CO_2(g) + 6\ H_2O(l)$

E) $4\ NH_3(g) + 5\ O_2(g) \rightarrow 4\ NO(g) + 6\ H_2O(g)$

6) How many grams of ethylene (C_2H_4) would have to be burned to produce 450 kJ of heat?

$C_2H_4(g) + 3O_2(g) \rightarrow 2CO_2(g) + H_2O(l)\ \Delta H°_{rxn} = -1411$ kJ/mol

A) 5.95 g

B) 695 g

C) 7.95 g

D) 8.95 g

E) None of the above

7) Calculate the heat released (kJ) in the reaction of 3.50 g of acetylene (C_2H_2) and excess hydrogen gas to form ethane gas:

$C_2H_2(g) + 2H_2(g) \rightarrow C_2H_6(g)$

Given:

$2C_2H_2(g) + 5O_2(g) \rightarrow 4CO_2(g) + 2H_2O(g)\ \Delta H = -2320$ kJ/mol

$2C_2H_6(g) + 7O_2(g) \rightarrow 4CO_2(g) + 6H_2O(g)\ \Delta H = -3040$ kJ/mol

$2H_2(g) + O_2(g) \rightarrow 2H_2O(g)\ \Delta H = -572$ kJ/mol

A) 27.5 kJ

B) 28.5 kJ

C) 29.5 kJ

D) 30.5 kJ

E) None of the above

8) Which one of the following substances is expected to have the highest boiling point?

A) HBr
B) HCl
C) HF
D) HI

9) Which one of the following substances will have both dispersion forces and dipole-dipole forces?

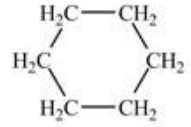
A) HCl
B) BCl_3
C) Br_2
D) H_2
E) CO_2

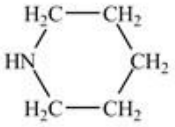
10) Which two properties are more typical of molecular compounds than of ionic compounds?

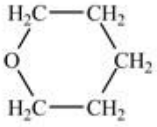
1. They are gases or liquids at room temperature.
2. They have high melting points.
3. Solids do not conduct electricity, but liquids do.
4. Atoms share electrons.

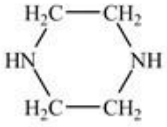
A) 1 and 4
B) 1 and 3
C) 2 and 3
D) 2 and 4
E) 3 and 4

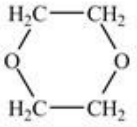
11) Which of the following liquids would have the lowest viscosity at 25°C?

A. 

B. 

C. 

D. 

E. 

A) A

B) B

C) C

D) D

E) E

12) The number of atoms in a body-centered and face-centered cubic unit cell is

A) 1 and 3

B) 2 and 4

C) 3 and 2

D) 4 and 4

E) 8 and 3

13) SrF_2 crystallizes such that the Sr^{2+} ions are in a face-centered cubic arrangement and the F^- ions are in the holes of the lattice (*fluorite* structure). How many F^- ions are present in one unit cell of this crystal?

A) 1

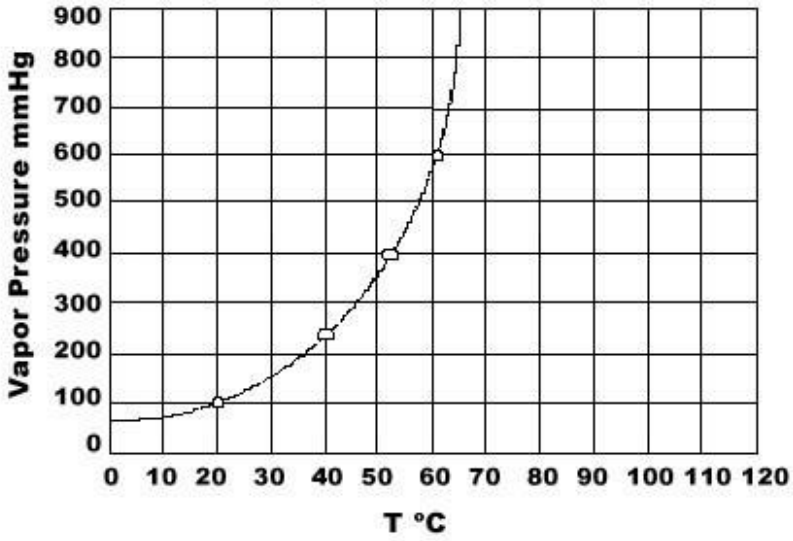
B) 2

C) 4

D) 6

E) 8

14) Use the graph of vapor pressure to determine the normal boiling point of $CHCl_3$.



A) 19°C

B) 52°C

C) 60°C

D) 64°C

E) 70°C

15) Find the temperature at which ethanol boils on a day in the mountains when the barometric pressure is 547 mmHg. (Given: The heat of vaporization of ethanol is 39.3 kJ/mol; the normal boiling point of ethanol is 78.3°C.)

A) 10.0°C

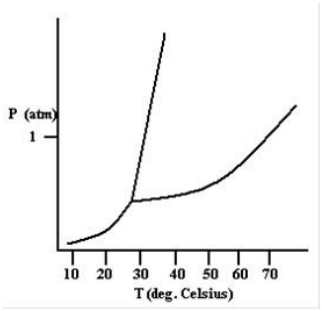
B) 69.9°C

C) 74.6°C

D) 76.5°C

E) 77.9°C

16) Based on the phase diagram shown below, how will the melting point of the substance change if the pressure is increased above 1 atm?



A) The melting point will decrease.

B) The melting point will remain the same.

C) The melting point will increase.

D) The substance will not melt at pressures of 1 atm and above; instead, the solid sublimes to form the gas phase.

17) Given that the heat of vaporization of mercury is 59.0 kJ/mol and the vapor pressure of mercury is 0.0017 torr at 25°C, calculate the normal boiling point of mercury.

A) 320°C

B) 340°C

C) 360°C

D) 380°C

E) None of the above