SAT Chemistry Practice Test 15

SAT Chemistry Practice Test 1: Part C

1. Twenty-five percent of element X exists as ^{210}X and 75 percent of it exists as ^{214}X. What is the atomic weight of element X in AMU?

A. 85

B. 211

C. 212

D. 213

E. 214

2. A 600-milliliter container holds 2 moles of O_2(*g*), 3 moles of H_2(*g*), and 1 mole of He(*g*). Total pressure within the container is 760 torr. What is the partial pressure of O_2?

A. 127 torr

B. 253 torr

C. 380 torr

D. 507 torr

E. 760 torr

3. $Fe(OH)_3(s) \rightleftharpoons Fe^{3+}(aq) + 3OH^-(aq)$

The ionic solid $Fe(OH)_3$ is added to water and dissociates into its component ions, as shown above. The solubility product expression for the saturated solution is

A. $K_{sp} = [Fe^{3+}]\,[OH^-]$

B. $K_{sp} = [Fe^{3+}]\,[3OH^-]$

C. $K_{sp} = [Fe^{3+}]\,[3OH^-]^3$

D. $K_{sp} = [Fe^{3+}]\,[OH^-]^3$

E. $K_{sp} = \dfrac{[Fe^{3+}]\,[OH^-]^3}{[Fe(OH)_3]}$

4. Which of the following electron configurations represents an atom of magnesium in an excited state?

A. $1s^2 2s^2 2p^6$

B. $1s^22s^22p^63s^2$

C. $1s^22s^22p^53s^23p^2$

D. $1s^22s^22p^63s^13p^1$

E. $1s^22s^22p^63s^13p^2$

5. All of the following when added to water will produce an electrolytic solution EXCEPT

A. $N_2(g)$

B. $HCl(g)$

C. $KOH(s)$

D. $NaI(s)$

E. $CaCl_2(s)$

6. $NH_3\ (aq) + H_2CO_3\ (aq) \rightleftharpoons NH_4^+(aq) + HCO_3^-\ (aq)$

In the reaction represented above, NH_4^+ acts as a(n)

A. indicator

B. hydrate

C. acid

D. base

E. salt

7. Which species has the ground state electron configuration $1s^22s^22p^63s^23p^6$?

A. Sulfide ion, S^{2-}

B. Bromide ion, Br^-

C. Neon atom, Ne

D. Chromium ion, Cr^{3+}

E. Potassium atom, K

8. Which of the following species is amphoteric?

A. Na_3PO_4

B. HSO_4^-

C. KOH

D. HNO_3

E. $C_2O^{2-}{}_4$

9. An ideal gas has a volume of 10 liters at 20°C and a pressure of 750 mmHg. Which of the following expressions is needed to determine the volume of the same amount of gas at STP?

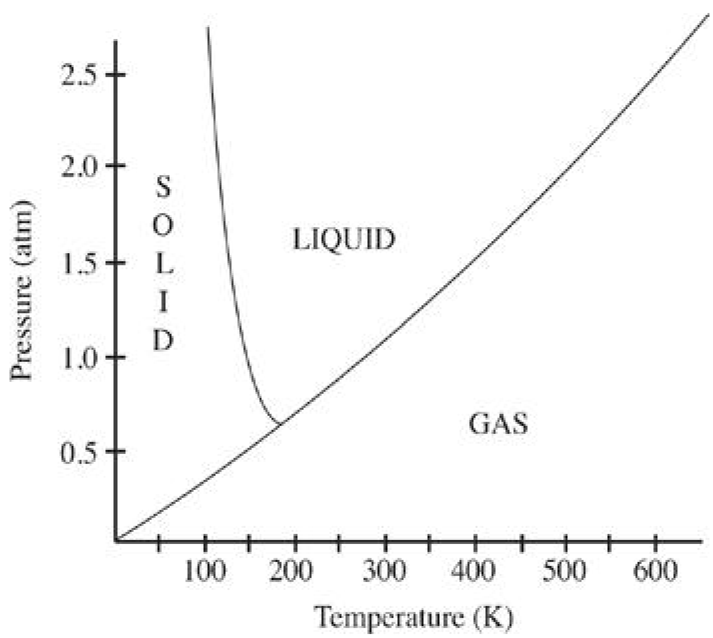
A. $10 \times \frac{750}{760} \times \frac{0}{20}$ L

B. $10 \times \frac{750}{760} \times \frac{293}{273}$ L

C. $10 \times \frac{760}{750} \times \frac{0}{20}$ L

D. $10 \times \frac{760}{750} \times \frac{273}{293}$ L

E. $10 \times \frac{750}{760} \times \frac{273}{293}$ L



10. Substance Z is at 0.5 atm and 200 K. If the pressure on substance Z is steadily increased and its temperature is kept constant, what phase change will eventually occur?

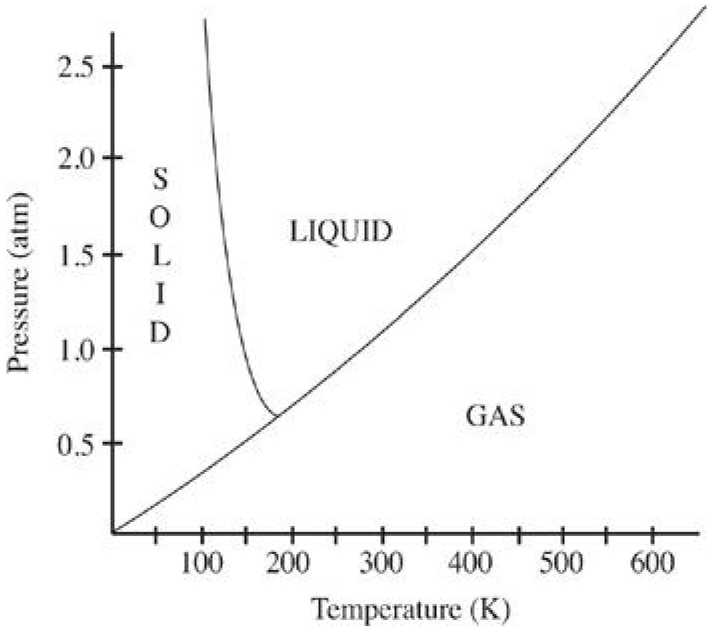
A. Condensation

B. Freezing

C. Melting

D. Sublimation

E. Vaporization



11. The normal boiling point of substance Z is closest to

A. 100 K

B. 200 K

C. 300 K

D. 400 K

E. 500 K

12. The shape of a PCl_3 molecule is described as

A. bent

B. trigonal pyramidal

C. linear

D. trigonal planar

E. tetrahedral

13. What volume of 0.4 *M* $Ba(OH)_2$ (*aq*) is needed to exactly neutralize 100 milliliters of 0.2 *M* HBr(*aq*)?

A. 25 mL

B. 50 mL

C. 100 mL

D. 200 mL

E. 400 mL

14. Which of the following is true regarding the aqueous dissociation of HCN, $K_a = 4.9 \times 10^{-10}$ at 25°C?

I. At equilibrium, $[H^+] = [CN^-]$

II. At equilibrium, $[H^+] > [HCN]$

III. HCN*(aq)* is a strong acid.

A. I only

B. II only

C. I and II only

D. II and III only

E. I, II, and III

15. Which of the following atoms has the largest second ionization energy?

A. Silicon, Si

B. Calcium, Ca

C. Chlorine, Cl

D. Iron, Fe

E. Sodium, Na

16. Question below refers to the overall reaction and half-reactions with standard reduction potentials below.

$2Fe^{2+} + Cl_2 \rightarrow 2Fe^{3+} + 2Cl^{?}$

$Fe^{3+} + e^- \rightarrow Fe^{2+}$; $E^o_{red} = 0.77$ volts

$Cl_2 + 2e^- \rightarrow 2Cl^-$; $E^o_{red} = 1.36$ volts

62.The standard potential difference of an electro-chemical cell using the overall reaction above is

A. 0.18 volts

B. 0.59 volts

C. 1.05 volts

D. 2.13 volts

E. 2.90 volts

17. The reaction of zinc metal, Zn, and hydrochloric acid, HCl, produces which of the following?

I. $H_2(g)$

II. $Cl_2(g)$

III. $Zn^{2+}(aq)$

A. II only

B. III only

C. I and II only

D. I and III only

E. I, II, and III

18. $2H_2S(g) + 3O_2(g) \rightleftharpoons 2SO_2(g) + 2H_2O(g)$ + heat

For the above reaction, the equilibrium concentration of $SO_2(g)$ can be increased by

A. adding neon gas

B. increasing the temperature

C. adding a catalyst

D. increasing the concentration of $H_2O(g)$

E. increasing the concentration of $O_2(g)$

19. $2H_2S(g) + 3O_2(g) \rightleftharpoons 2SO_2(g) + 2H_2O(g)$ + heat

Which of the following is increased by decreasing the volume of the reaction system?

I. Rate of reaction

II. Equilibrium concentration of reactants

III. Value of K_{eq}

A. I only

B. III only

C. I and II only

D. II and III only

E. I, II, and III

20. $2H_2S(g) + 3O_2(g) \rightleftharpoons 2SO_2(g) + 2H_2O(g)$ + heat

$Fe_2O_3(s) + 3CO(g) \rightarrow 2Fe(s) + 3CO_2(g)$

When 3 moles of Fe_2O_3 are allowed to completely react with 56 grams of CO according to the above equation, approximately how many moles of iron, Fe, are produced?

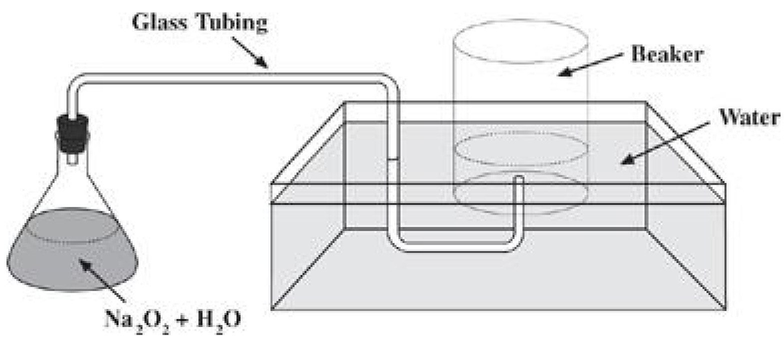
A. 0.7

B. 1.3

C. 2

D. 2.7

E. 6



21. $2Na_2O_2(s) + 2H_2O(l) \rightarrow 4NaOH(aq) + O_2(g)$

Sodium peroxide, Na_2O_2, and water react in the flask at 25°C according to the equation and in the diagram above. If water levels are equal inside and outside the beaker, then the gas pressure inside the beaker is equal to the

A. pressure of oxygen gas collected

B. vapor pressure of water at 25°C

C. sum of pressure of oxygen gas collected and atmospheric pressure

D. sum of vapor pressure of water at 25°C and atmospheric pressure

E. sum of pressure of oxygen gas collected and vapor pressure of water at 25°C

22. Which of the following molecules has the strongest carbon-to-carbon bond?

A. C_2H_2

B. C_2H_4

C. C_2H_6

D. C_3H_8

E. C_4H_{10}

23. $N_2O_4(g) \rightleftharpoons 2NO_2(g)$

The following concentration data were gathered for the above reaction at 5 minute intervals from the start of an experiment:

Time After Start of Experiment	$[N_2O_4]$	$[NO_2]$
??0 min (start)	0.00 *M*	0.50 *M*
??5 min	0.10 *M*	0.33 *M*
10 min	0.20 *M*	0.20 *M*
15 min	0.25 *M*	0.15 *M*
20 min	0.28 *M*	0.13 *M*
25 min	0.28 *M*	0.13 *M*

If the experiment was carried out in a closed system at constant temperature, then during which time interval (from the start of the experiment) did the reaction most likely achieve equilibrium?

A. 0 min (start) to 5 min

B. 5 min to 10 min

C. 10 min to 15 min

D. 15 min to 20 min

E. 20 min to 25 min