Exam

Name_____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) The total concentration of ions in a 0.250 M solution of HCl is _____. 1) _____
A) 0.250 M
B) 0.500 M
C) 0.125 M
D) 0.750 M
E) essentially zero.

2) A weak electrolyte exists predominantly as _____ in solution. 2) _____
A) electrons
B) molecules
C) atoms
D) ions
E) an isotope

3) Which of the following are strong electrolytes? 3) _____
HCl
$HC_2H_3O_2$
NH_3
KCl
A) HCl, $HC_2H_3O_2$, NH_3, KCl
B) $HC_2H_3O_2$, KCl
C) HCl, NH_3, KCl
D) HCl, $HC_2H_3O_2$, KCl
E) HCl, KCl

4) Which of the following are weak electrolytes? 4) _____
HCl
$HC_2H_3O_2$
NH_3
KCl
A) HCl , $HC_2H_3O_2$, NH_3 , KCl
B) HCl , KCl
C) $HC_2H_3O_2$, KCl
D) $HC_2H_3O_2$, NH_3
E) HCl , $HC_2H_3O_2$, KCl

5) When aqueous solutions of _____ are mixed, a precipitate forms. 5) _____
A) NaI and KBr
B) Li_2CO_3 and CsI
C) K_2SO_4 and $CrCl_3$
D) KOH and $Ba(NO_3)_2$
E) $NiBr_2$ and $AgNO_3$

6) The net ionic equation for the reaction between aqueous solutions of HF and KOH is _____. 6) _____

A) $HF + KOH \rightarrow H_2O + K^+ + F^-$

B) $HF + K^+ + OH^- \rightarrow H_2O + KF$

C) $HF + OH^- \rightarrow H_2O + F^-$

D) $H^+ + F^- + K^+ + OH^- \rightarrow H_2O + K^+ + F^-$

E) $H^+ + OH^- \rightarrow H_2O$

7) What are the spectator ions in the reaction between KOH (aq) and HNO_3 (aq)? 7) _____

A) H^+ and OH^-

B) K^+ and H^+

C) OH^- only

D) H^+ and NO_3^-

E) K^+ and NO_3^-

8) The balanced net ionic equation for precipitation of $CaCO_3$ when aqueous solutions of Na_2CO_3 and $CaCl_2$ are mixed is _____. 8) _____

A) $2Na^+ (aq) + CO_3^{2-} (aq) \rightarrow Na_2CO_3 (aq)$

B) $Ca^{2+} (aq) + CO_3^{2-} (aq) \rightarrow CaCO_3 (s)$

C) $2Na^+ (aq) + 2Cl^- (aq) \rightarrow 2NaCl (aq)$

D) $Na_2CO_3 (aq) + CaCl_2 (aq) \rightarrow 2NaCl (aq) + CaCO_3 (s)$

E) $Na^+ (aq) + Cl^- (aq) \rightarrow NaCl (aq)$

9) What is the concentration (M) of KCl in a solution made by mixing 25.0 mL of 0.100 M KCl with 50.0 mL of 0.100 M KCl? 9) _____

A) 0.0333 B) 0.0250 C) 125 D) 0.100 E) 0.0500

10) What is the concentration (M) of CH_3OH in a solution prepared by dissolving 11.7 g of CH_3OH in sufficient water to give exactly 230 mL of solution? 10) _____

A) 11.9×10^{-3}

B) 11.9

C) 0.0841

D) 1.59

E) 1.59×10^{-3}

11) How many grams of NaOH (MW = 40.0) are there in 500.0 mL of a 0.175 M NaOH solution? 11) _____

A) 114

B) 2.19×10^{-3}

C) 14.0

D) 3.50

E) 3.50×10^3

12) There are _____ mol of bromide ions in 0.500 L of a 0.300 M solution of $AlBr_3$. 12) _____

A) 0.500 B) 0.0500 C) 0.450 D) 0.167 E) 0.150

13) How many moles of Co^{2+} are present in 0.200 L of a 0.400 M solution of CoI_2? 13) _____

A) 0.0400 B) 2.00 C) 0.0800 D) 0.160 E) 0.500

14) How many moles of K^+ are present in 343 mL of a 1.27 M solution of K_3PO_4? 14) _____

A) 0.145 B) 1.31 C) 0.436 D) 11.1 E) 3.70

15) Calculate the concentration (M) of sodium ions in a solution made by diluting 50.0 mL of a 0.874 M solution of sodium sulfide to a total volume of 250.0 mL. 15) _____

A) 0.350 B) 0.175 C) 4.37 D) 0.525 E) 0.874

16) The concentration (M) of an aqueous methanol produced when 0.200 L of a 2.00 M solution was diluted to 0.800 L is _____. 16) _____

A) 0.400 B) 0.200 C) 0.800 D) 0.500 E) 8.00

17) How many grams of sodium chloride are there in 55.0 mL of a 1.90 M aqueous solution of sodium chloride? 17) _____

A) 12.2
B) 0.105
C) 6.11×10^3
D) 6.11
E) 3.21

18) Which solution contains the largest number of moles of chloride ions? 18) _____

A) 10.0 mL of 0.500*M* $BaCl_2$
B) 4.00 mL of 1.000*M* NaCl
C) 30.00 mL of 0.100*M* $CaCl_2$
D) 7.50 mL of 0.500*M* $FeCl_3$
E) 25.00 mL of 0.400*M* KCl

19) The molarity of a solution prepared by diluting 43.72 mL of 5.005 M aqueous $K_2Cr_2O_7$ to 500. mL is _____. 19) _____

A) 0.870 B) 57.2 C) 0.438 D) 0.0044 E) 0.0879

20) In a titration of 35.00 mL of 0.737 M H_2SO_4, _____ mL of a 0.827 M KOH solution is required for neutralization. 20) _____

A) 25.8 B) 35.0 C) 62.4 D) 39.3 E) 1.12

21) Oxalic acid is a diprotic acid. Calculate the percent of oxalic acid ($H_2C_2O_4$) in a solid given that a 0.7984 g sample of that solid required 37.98 mL of 0.2283 M NaOH for neutralization. 21) _____

A) 22.83 B) 1.086 C) 97.78 D) 28.59 E) 48.89

22) A 25.5 mL aliquot of HCl (aq) of unknown concentration was titrated with 0.113 M NaOH (aq). It took 51.2 mL of the base to reach the endpoint of the titration. The concentration (M) of the acid was _____. 22) _____

A) 0.113 B) 1.02 C) 0.114 D) 0.454 E) 0.227

23) A 31.5 mL aliquot of H_2SO_4 (aq) of unknown concentration was titrated with 0.0134 M NaOH (aq). It took 23.9 mL of the base to reach the endpoint of the titration. The concentration (M) of the acid was _____. 23) _____

A) 0.227 B) 0.00508 C) 0.0102 D) 0.102 E) 0.0204

24) What mass (g) of CaF_2 is formed when 47.8 mL of 0.334 M NaF is treated with an excess of aqueous calcium nitrate? 24) _____

A) 2.49 B) 1.25 C) 0.623 D) 0.943 E) 0.472

25) What volume (L) of 0.250 M HNO_3 is required to neutralize a solution prepared by dissolving 17.5 g of NaOH in 350 mL of water? 25) _____

A) 50.0
B) 1.75×10^{-3}
C) 1.75
D) 0.070
E) 0.44

26) A solution is prepared by mixing 50.0 mL of 0.100 M HCl and 10.0 mL of 0.200 M NaCl. What is the molarity of chloride ion in this solution? 26) _____

A) 0.183 B) 0.117 C) 8.57 D) 3.50 E) 0.0500

27) Lead ions can be precipitated from aqueous solutions by the addition of aqueous iodide: 27) _____

$$Pb^{2+}(aq) + 2I^{-}(aq) \rightarrow PbI_2(s)$$

Lead iodide is virtually insoluble in water so that the reaction appears to go to completion. How many milliliters of 3.550 M HI(aq) must be added to a solution containing 0.700 mol of $Pb(NO_3)_2$ (aq) to completely precipitate the lead?

A) 197
B) 0.394
C) 0.197
D) 394
E) 2.54×10^{-3}

28) How many milliliters of 0.132 M $HClO_4$ solution are needed to neutralize 50.00 mL of 0.0789 M NaOH? 28) _____

A) 0.0335 B) 0.0120 C) 0.521 D) 29.9 E) 83.7