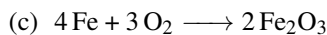
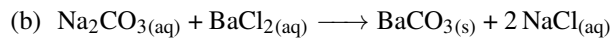
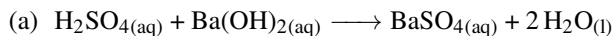


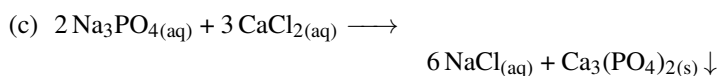
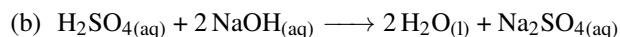
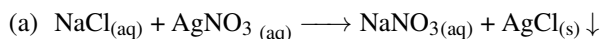
Full Name:

February 22,  
2023

**0.1** Classify the following reaction as acid-base or precipitation:



**0.2** Classify the following reaction as acid-base or precipitation:



**0.3** Break down the following compounds into ions: (a)  $\text{H}_2\text{SO}_4$

(b)  $\text{HNO}_3$  (c)  $\text{KMnO}_4$

**0.4** Break down the following compounds into ions: (a)  $\text{Ca}(\text{OH})_2$

(b)  $\text{K}_2\text{CrO}_4$  (c)  $\text{Ca}(\text{NO}_3)_2$

**0.5** Indicate whether solutions of the following chemicals will have ions (I), ions and molecules (I+M), or just molecules (M):

Chemical	I	I+M	M
$\text{H}_2\text{O}$			
$\text{NO}_2$			
$\text{CO}_2$			

**0.6** Indicate whether solutions of the following chemicals will have ions (I), ions and molecules (I+M), or just molecules (M):

Chemical	I	I+M	M
$\text{NaCl}$			
$\text{HCl}$			
$\text{CaCl}_2$			

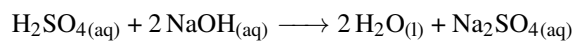
**0.7** Indicate the soluble/insoluble character of the following compounds:

Chemical	Soluble	Insoluble
$\text{NaCH}_3\text{COO}$		
$\text{NaHCO}_3$		
$\text{Ag}_2\text{SO}_4$		
$\text{NaCrO}_4$		
$\text{CaS}$		

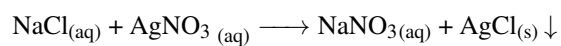
**0.8** Indicate the soluble/insoluble character of the following compounds:

Chemical	Soluble	Insoluble
AgNO <sub>3</sub>		
AgBr		
CaCO <sub>3</sub>		
Na <sub>2</sub> CO <sub>3</sub>		

**0.9** Obtain the net ionic equation for the following reaction:



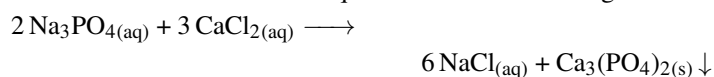
**0.10** Obtain the net ionic equation for the following reaction:



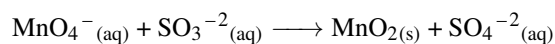
**0.11** Obtain the net ionic equation for the following reaction:



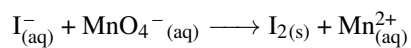
**0.12** Obtain the net ionic equation for the following reaction:



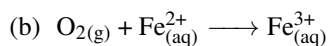
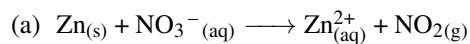
**0.13** Balance the following redox reactions in acidic medium:



**0.14** Balance the following redox reactions in acidic medium:

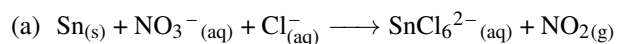


**0.15** Balance the following redox reactions in acidic medium:

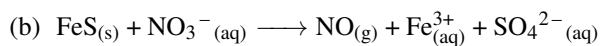
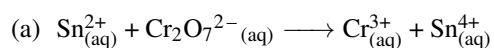


**0.16**

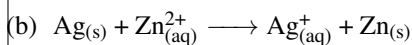
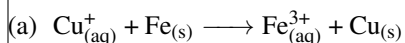
**0.17** Balance the following redox reaction in basic medium:



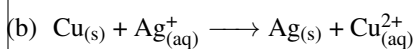
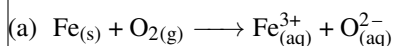
**0.18** Balance the following redox reactions in basic medium:



**0.19** Balance the following redox reactions:



**0.20** Balance the following redox reactions:



**0.21** What is the concentration of a solution prepared when 100mL a 4% HCl solution is diluted to a final volume of 500mL.

**0.22** What is the final volume when 50mL of a 2M NaCl solution is diluted to a 1M.

**0.23** Describe how to prepare 100mL of a 0.1M  $\text{H}_2\text{SO}_4$  solution, starting with a 2M stock  $\text{H}_2\text{SO}_4$  solution.

**0.24** Describe how to prepare 50mL of a 0.5M  $\text{H}_2\text{SO}_4$  solution, starting with a 1M stock  $\text{H}_2\text{SO}_4$  solution.

**0.25** Classify the following molecules as polar or nonpolar: (a)  $\text{H}_2\text{O}_{(l)}$   
(b)  $\text{C}_5\text{H}_{12(l)}$  (c)  $\text{CH}_3\text{COOH}_{(l)}$  (d)  $\text{CH}_3\text{OH}_{(l)}$

**0.26** Classify the following molecules as polar or nonpolar: (a)  $\text{C}_6\text{H}_{14(l)}$   
(b)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}_{(l)}$  (c)  $\text{C}_5\text{H}_{10(l)}$  (d)  $\text{C}_6\text{H}_5\text{CH}_3(l)$  (e)  $\text{CH}_3\text{CH}_2\text{OH}_{(l)}$   
(f)  $\text{C}_6\text{H}_5\text{NH}_2(l)$

**0.27** A solution is prepared by mixing 15g of KCl in 50g of water. Calculate the mass percent of solute.

**0.28** Sodium hydroxide NaOH, a very strong base, is a chemical used in drain cleaners. A drain cleaning solution is prepared by mixing 25g of NaOH in 250g of water. Calculate the mass percent of solute.

**0.29** Vinegar is not a pure chemical, it is indeed a (m/m) 5% acetic acid solution. How many grams of acetic acid are there in 2g of vinegar.

**0.30** Alcohol-hydroxide is a mixture of a base with an organic alcohol, employed to clean glass. An alcohol-hydroxide mixture is prepared by mixing 60g of NaOH with 500g of ethanol. Calculate: (a) the mass percent of solvent. (b) the mass percent of solute.

**0.31** Order the following solution from more to less concentrated: (a) Solution A ( $4.3 \times 10^{-5}\text{M}$ ) (b) Solution B ( $6.1 \times 10^{-3}\text{M}$ ) (c) Solution C ( $6.4 \times 10^{-4}\text{M}$ )

**0.32** Order the following solution from more to less concentrated:  
(a) A vanillin solution ( $1.3 \times 10^{-1}\text{M}$ ) (b) An adrenaline solution ( $1.1 \times 10^3\text{M}$ ) (c) Vinegar, an acetic acid solution ( $1.2 \times 10^0\text{M}$ )

**0.33** Which chemicals from the following list will mix with  $\text{C}_5\text{H}_{12}(\text{l})$ : (a)  $\text{H}_2\text{O}(\text{l})$  (b)  $\text{C}_6\text{H}_{14}(\text{l})$  (c)  $\text{CH}_3\text{COOH}(\text{l})$

**0.34** Which chemicals from the following list will mix with  $\text{H}_2\text{O}(\text{l})$ : (a)  $\text{NH}_3(\text{l})$  (b)  $\text{C}_5\text{H}_{12}(\text{l})$  (c)  $\text{C}_6\text{H}_{14}(\text{l})$

**0.35** How many mL of a 0.001M  $\text{Ca}(\text{OH})_2$  (MW=74g/mol) solution can be prepared from 5 mg of  $\text{Ca}(\text{OH})_2$ .

**0.36** How many grams of solute are there in 100mL of a 0.01M  $\text{HNO}_3$  (MW=63g/mol) solution.

**0.37** How many mL of a 3M KCl solution contains 0.06 moles of KCl.

**0.38** An HCl solution is prepared by mixing 4 moles of HCl with water until reaching a volume of 250mL. Calculate the molarity of the solution.

**0.39** How many mL of a 1M NaCl (MW=58g/mol) solution contains 4 grams of NaCl.

**0.40** How many mL of a 4M NaCl (MW=58g/mol) solution contains 5 grams of NaCl.

**0.41** A solution is made by mixing 2 mL of a solute and 100mL of solvent. Calculate the Percent Volume/Volume.

**0.42** Vanilla extract is a solution vanillin in ethanol. A vanilla solution is made by mixing 15 mL of pure vanillin and 50mL of ethanol. Calculate the Percent Volume/Volume.

**0.43** A solution is prepared by mixing 5 g of Au<sub>(s)</sub> and 2 g of Cu<sub>(s)</sub>. Indicate the true statement: (a) Au is the solute (b) Cu is the solute (c) Both elements do not mix (d) The mixture is not a solution

**0.44** A solution is prepared by mixing 4 g of C<sub>6</sub>H<sub>6(l)</sub> and 10 g of CCl<sub>4(l)</sub>. Indicate the true statement: (a) C<sub>6</sub>H<sub>6</sub> is the solute (b) CCl<sub>4</sub> is the solute (c) Both chemicals do not mix (d) The mixture is not a solution



**Answers** v. 60 **0.1** (a) Acid-base (b) Precipitation (c) redox **0.2** (a) Precipitation (b) Acid-base (c) Precipitation **0.3** (a)  $2\text{H}^+ + \text{SO}_4^{2-}$  (b)  $\text{H}^+ + \text{NO}_3^-$  (c)  $\text{K}^+ + \text{MNO}_4^-$  **0.4** (a)  $(\text{Ca}^{2+} + 2\text{OH}^-)$  (b)  $2\text{K}^+ + \text{CrO}_4^{2-}$  (c)  $\text{Ca}^{2+} + 2\text{NO}_3^-$  **0.5**  $\text{H}_2\text{O}$  (M+I);  $\text{NO}_2$  (M);  $\text{CO}_2$  (M) **0.6**  $\text{NaCl}$  (I);  $\text{HCl}$  (I);  $\text{CaCl}_2$  (I) **0.7**  $\text{NaCH}_3\text{COO}$  (Soluble);  $\text{NaHCO}_3$  (Soluble);  $\text{Ag}_2\text{SO}_4$  (Insoluble);  $\text{NaCrO}_4$  (Soluble);  $\text{CaS}$  (Insoluble); **0.8**  $\text{AgNO}_3$  (Soluble);  $\text{AgBr}$  (Insoluble);  $\text{CaCO}_3$  (Soluble);  $\text{Na}_2\text{CO}_3$  (Soluble) **0.9**

**0.10**  $\text{Ag}^+_{(\text{aq})} + \text{Cl}^-_{(\text{aq})} \longrightarrow \text{AgCl}_{(\text{s})} \downarrow$  **0.11**  $\text{HSO}_4^-_{(\text{aq})} + \text{NH}_3_{(\text{aq})} \longrightarrow \text{NH}_4^+_{(\text{aq})} + \text{SO}_4^{2-}_{(\text{aq})}$  **0.12**  $3\text{Ca}^{2+}_{(\text{aq})} + 2\text{PO}_4^{3-}_{(\text{aq})} \longrightarrow \text{Ca}_3(\text{PO}_4)_2_{(\text{s})} \downarrow$  **0.13**  $2\text{MnO}_4^-_{(\text{aq})} + 2\text{H}^+ + 3\text{SO}_3^{2-}_{(\text{aq})} \longrightarrow \text{H}_2\text{O}_{(\text{l})} + 2\text{MnO}_{2(\text{s})} + 3\text{SO}_4^{2-}_{(\text{aq})}$  **0.14**  $10\text{I}^-_{(\text{aq})} + 2\text{MnO}_4^-_{(\text{aq})} + 16\text{H}^+_{(\text{aq})} \longrightarrow 5\text{I}_{2(\text{s})} + 2\text{Mn}^{2+}_{(\text{aq})} + 8\text{H}_2\text{O}_{(\text{l})}$  **0.15** No solution listed **0.16** **0.17** No solution listed **0.18** No solution listed **0.19** (a)  $3\text{Cu}^+_{(\text{aq})} + \text{Fe}_{(\text{s})} \longrightarrow \text{Fe}^{3+}_{(\text{aq})} + 3\text{Cu}_{(\text{s})}$  (b)  $2\text{Ag}_{(\text{s})} + \text{Zn}^{2+}_{(\text{aq})} \longrightarrow 2\text{Ag}^+_{(\text{aq})} + \text{Zn}_{(\text{s})}$  **0.20** (a)  $4\text{Fe}_{(\text{s})} + 3\text{O}_{2(\text{g})} \longrightarrow 4\text{Fe}^{3+}_{(\text{aq})} + 6\text{O}^{2-}_{(\text{aq})}$  (b)  $\text{Cu}_{(\text{s})} + 2\text{Ag}^+_{(\text{aq})} \longrightarrow 2\text{Ag}_{(\text{s})} + \text{Cu}^{2+}_{(\text{aq})}$  **0.21** 0.8 % **0.22** 100 mL **0.23** 5mL **0.24** 25mL **0.25** (a)  $\text{H}_2\text{O}_{(\text{l})}$  (polar) (b)  $\text{C}_5\text{H}_{12(\text{l})}$  (nonpolar) (c)  $\text{CH}_3\text{COOH}_{(\text{l})}$  (polar) (d)  $\text{CH}_3\text{OH}_{(\text{l})}$  (polar) **0.26** (a)  $\text{C}_6\text{H}_{14(\text{l})}$  (nonpolar) (b)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}_{(\text{l})}$  (polar) (c)  $\text{C}_5\text{H}_{10(\text{l})}$  (nonpolar) (d)  $\text{C}_6\text{H}_5\text{CH}_3_{(\text{l})}$  (nonpolar) (e)  $\text{CH}_3\text{CH}_2\text{OH}_{(\text{l})}$  (polar) (f)  $\text{C}_6\text{H}_5\text{NH}_2_{(\text{l})}$  (polar) **0.27** 23% **0.28** 9% **0.29** 0.1 g **0.30** (a) 89% (b) 11% **0.31**  $\text{A} \geq \text{C} \geq \text{B}$  **0.32**  $\text{adrenaline} \geq \text{vinegar} \geq \text{vanillin}$  **0.33**  $\text{C}_6\text{H}_{14(\text{l})}$  (nonpolar) **0.34**  $\text{NH}_3_{(\text{l})}$  (polar) **0.35** 67.56mL **0.36** 0.062g **0.37** 20mL **0.38** 16M **0.39** 69mL **0.40** 21mL **0.41** 1.9% **0.42** 23% **0.43** Cu is the solute **0.44**  $\text{C}_6\text{H}_6$  is the solute



