

CHEMISTRY DEPARTMENT OF SCIENCE

Name: _____ () Class: SEC 3 _____

ACIDS & BASES – ASSIGNMENT



1. A 50 cm³ sample of acid was placed in a beaker, and universal indicator was added. Aqueous alkali was then added gradually, and the pH of the solution measured at regular intervals.

Below shows the graph of the resulting pH against volume of sodium hydroxide added.



What is the volume of aqueous sodium hydroxide required to neutralise the acid sample?

	A 10 cm ³
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- 2. Which one of the following statements is the most accurate definition of an acid?
 - **A** An acid is a substance that liberates carbon dioxide when added to a carbonate.
 - **B** An acid is a substance that produces hydrogen ions in aqueous solution.
 - **C** An acid is a substances that turns blue litmus solution red
 - **D** An acid is a substance that reacts with a base.

3. The pH of several household substances is shown below:

Substance	green tea	kitchen cleaner	polish remover	vinegar
pН	7.9	9.9	6.5	5.1

Which of the above substances would most likely produce a blue and yellow colour respectively when tested with universal indicator?

	blue	yellow
Α	green tea	polish remover
В	kitchen cleaner	green tea
С	polish remover	vinegar
D	vinegar	kitchen cleaner

- 4. Which of the following is **not** a property of an acid?
 - **A** Acids are soluble in water.
- **C** Acids have a sour taste.
- **B** Acids dissociate hydrogen molecules. **D** Acids turn litmus solution red.
- 5. Which one of the following must be true of an acidic gas?
 - **A** It is the only salt formed from a dibasic acid.
 - **B** It has dissociated hydrogen ions.
 - **C** It turns damp universal indicator paper orange.
 - **D** It turns dry blue litmus paper red.
- 6. Which of the following is **not** a similarity between ethanoic acid and hydrochloric acid? Both acids are
 - **A** monobasic acids.
 - **B** of a pH less than 7.

- **C** weak acids.
- **D** able to react with insoluble bases.
- 7. Citric acid, found in oranges, is a weak acid because it

 - A is used in food products.
 B is not very soluble in water.
 C is not completely ionised in solution.
 D freezes on a cold day.
- 8. The pH of four aqueous solutions **P**, **Q**, **R** and **S**, is as shown in the diagram below.



Which of the following sets of substances correctly corresponds with the pH of solutions P, **Q**, **R** & **S** (in this order)?

- **A** sulfuric acid; ethanoic acid; sodium chloride; aqueous ammonia
- **B** aqueous ammonia, sodium chloride; ethanoic acid; sulfuric acid
- C ethanoic acid; sulfuric acid; sodium chloride; aqueous ammonia
- **D** sulfuric acid; ethanoic acid; aqueous ammonia, sodium chloride

- 9. Carbonic acid, H₂CO₃, is considered to be dibasic because
 - **A** Each molecule of carbonic acid is able to react with two hydroxide ions.
 - **B** It contains twice the concentration of hydrogen ions compared to hydrochloric acid.
 - **C** It has two hydrogen atoms in its molecular structure before dissociation.
 - **D** The pH of carbonic acid is half that of a regular monobasic acid.
- 10. Jonathan places mixes a small sample of aqueous sodium hydroxide with another small sample of ammonium sulfate in a test tube, and warms the mixture gently over a bunsen burner.

sodium hydroxide + ammonium sulfate —→ salt X + gas Y + liquid Z

What would be the salt **X** produced in this reaction?

- **A** sulfuric acid
- **B** aqueous ammonia

- **C** ammonium hydroxide
- **D** sodium sulfate
- 11. Which of the following best describes this reaction:

NaOH (aq) + HNO₃ (aq) \rightarrow NaNO₃ (aq) + H₂O (I)

A titration reaction

- **C** nitrate reaction
- **B** water-producing reaction
- **D** neutralization reaction
- 12. Which two substances will react together to form water and a salt as the only products?
 - **A** dilute nitric acid + aqueous sodium carbonate
 - **B** aqueous barium chloride + aqueous sodium carbonate
 - **C** dilute sulfuric acid + zinc
 - **D** dilute sodium hydroxide + dilute phosphoric acid
- 13. Which of the following pairs of chemicals, when mixed, will produce salt, gas and water?
 - **C** nitric acid + sodium hydroxide A sulfuric acid + magnesium metal
 - **B** hydrochloric acid + calcium carbonate **D** carbonic acid + ammonium chloride
- 14. Powdered zinc carbonate is added to a solution of sulfuric acid until effervescence ceases. The pH of the solution

Α	decreases to about 7.	С	increases to about 12.
В	increases to about 7.	D	decreases to about 3.

- **B** increases to about 7.
- 15. Which of the following correctly shows the ionic equation for the formation of sodium chloride from dilute hydrochloric acid and aqueous sodium hydroxide?

 - $\begin{array}{ll} \textbf{A} & 2 \text{ Na}^+ (aq) + \text{Cl}_2 (aq) \longrightarrow 2 \text{ NaCl (s)} \\ \textbf{B} & \text{H}^+ (aq) + \text{NaOH (aq)} \longrightarrow \text{Na}^+ (aq) + \text{H}_2 \text{O (l)} \\ \end{array}$
 - **C** H^+ (aq) + OH^- (aq) $\longrightarrow H_2O$ (I)
 - **D** Na^+ (aq) + Cl^- (aq) $\longrightarrow NaCl$ (s)

16. Below shows some reactions of copper compounds. Which change is made by adding an acid?



17. Which one of the following elements forms a neutral oxide?



- 18. Which of the following sets of oxides contain one acidic oxide, one basic oxide, and one amphoteric oxide (not necessarily in order)?
 - A calcium oxide; magnesium oxide; sulfur dioxide
 - **B** calcium oxide; sulfur dioxide; zinc oxide
 - **C** aluminium oxide; carbon dioxide; carbon monoxide
 - **D** aluminium oxide; magnesium oxide; zinc oxide
- 19. A man suffering from an excess of acid in his stomach has no indigestion tablets. Which substance could he now take to lower this acidity?
 - A lemon juice B salt water C vinegar D baking soda
- 20. Which of the following substances is most commonly added to increase the pH of soil?
 - **A** $Ca(OH)_2$ (s) **B** CH_3COOH (aq) **C** NaOH (aq) **D** ZnO (s)

Structured Questions [10 Marks]

21.	21. Ammonium carbonate, due to the presence of both carbonate ions and ammonium ions, is a behave as a metal carbonate and also as an ammonium salt. It is hence able to react, separ with both acids and alkalis, producing different products.				
	(a) A sample of aqueous ammonium carbonate is allowed to react with dilute sulfuric acid.				
		(i)	Construct the chemical equation, with state symbols, for the reaction.	[2]	
		(ii)	Construct the ionic equation for the reaction.	[1]	
	(b)	A s	eparate sample is then allowed to react with aqueous sodium hydroxide.		
		(i)	Construct the chemical equation, with state symbols, for the reaction.	[2]	
		(ii)	Construct the ionic equation for the reaction.	[1]	
22.	Cor	nstru	ict chemical equations for		
	(a)	the	reaction between iron(III) oxide and sulfuric acid,	[1]	
	(b)	the	reaction between ammonium chloride and calcium hydroxide.	[1]	
23.	Cor	nstru	ict ionic equations for the following reactions.		
	(a)	Mg	(s) + 2 HCl (aq) \longrightarrow MgCl ₂ (aq) + H ₂ (g)	[1]	
	(b)	(NF	I₄)₂SO₄ (aq) + 2 LiOH (aq) —→ Li₂SO₄ (aq) + 2 H₂O (I) + 2 NH₃ (g)	[1]	

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