ALBERTA CHEMISTRY 20 · UNIT C · 25 QUESTIONS

Matter as Solutions, Acids and Bases — Practice Test

This practice test was made by AI and there may be mistakes. If a question or answer looks wrong, use the Flag a mistake button to let Brett know so he can fix it.

1 **A solution is prepared by dissolving 0.40 mol of solute in enough water to make 2.0 L of solution. The concentration of the solution is**

- **A** 0.20 mol/L
- **B** 0.80 mol/L
- **C** 2.0 mol/L
- **D** 5.0 mol/L

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2 **Which statement about an aqueous solution is correct?**

- **A** Water is always the solute in an aqueous solution
- **B** An aqueous solution must contain an ionic solute
- **C** Water is the solvent in an aqueous solution
- **D** An aqueous solution is always a strong electrolyte

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3 **Which of the following substances, when dissolved in water, produces a solution that conducts electricity well?**

- **A** $C_6H_{12}O_6(aq)$ (glucose)
- **B** $NaCl(aq)$
- **C** $C_2H_5OH(aq)$ (ethanol)
- **D** $C_{12}H_{22}O_{11}(aq)$ (sucrose)

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4 **A solution with a pH of 2 is compared to a solution with a pH of 4. The hydronium ion concentration of the pH 2 solution is greater by a factor of**

- A 2
- B 10
- C 20
- D 100

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5 **Which observation is a property of an acidic solution?**

- A It turns blue litmus red
- B It turns red litmus blue
- C It feels slippery to the touch
- D It has a pH greater than 7

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6 **A 100 mL sample of 2.0 mol/L hydrochloric acid is diluted with water to a final volume of 500 mL. The concentration of the diluted acid is**

- A 0.10 mol/L
- B 1.0 mol/L
- C 0.40 mol/L
- D 10 mol/L

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7 **The amount of solute in 3.0 L of a 0.25 mol/L solution is**

- A 0.083 mol
- B 0.75 mol
- C 8.3 mol
- D 12 mol

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8 **A 25.0 mL sample of 6.0 mol/L HCl(aq) is diluted to a final volume of 250.0 mL. The concentration of the diluted solution, to the nearest hundredth, is _____ mol/L.**

ANSWER _____

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9 **A solution that contains undissolved solute, and in which the rate of dissolving equals the rate of crystallizing, is best described as**

A unsaturated

B dilute

C concentrated

D saturated

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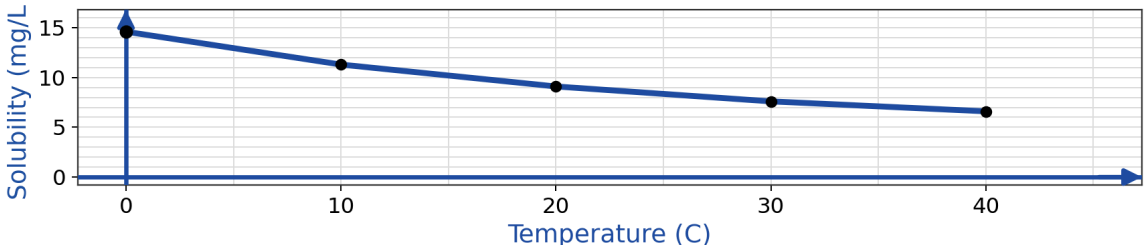
10 **The graph below shows the solubility of oxygen gas in water at different temperatures. What is the solubility of oxygen at 20°C?**



- **A** 6.6 mg/L
- **B** 9.1 mg/L
- **C** 11.3 mg/L
- **D** 14.6 mg/L

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11 **Which chemical equation represents a neutralization reaction?**

- **A** $Zn(s) + 2HCl(aq) \rightarrow ZnCl_2(aq) + H_2(g)$
- **B** $HNO_3(aq) + KOH(aq) \rightarrow KNO_3(aq) + H_2O(l)$
- **C** $CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$
- **D** $2H_2O_2(aq) \rightarrow 2H_2O(l) + O_2(g)$

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12 **A student must prepare 500.0 mL of 0.250 mol/L NaOH(aq) from solid sodium hydroxide, molar mass 40.00 g/mol. The mass of NaOH(s) required, to the nearest hundredth of a gram, is ____ g.**

ANSWER _____

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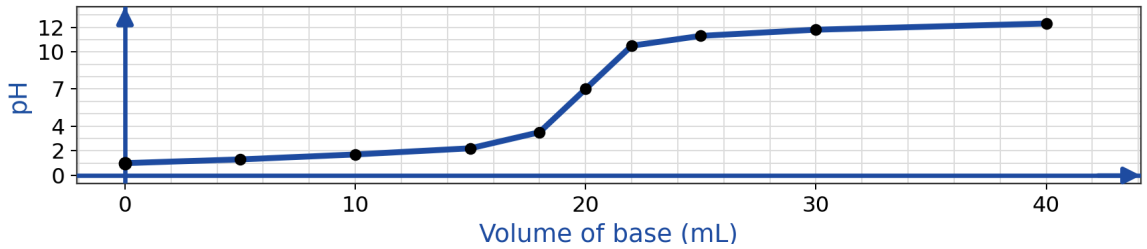
13 **The titration curve below shows the pH as sodium hydroxide is added to hydrochloric acid. At what volume of sodium hydroxide is the equivalence point reached?**



A 10 mL

B 15 mL

C 20 mL

D 30 mL

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14 **A 25.0 mL sample of NaOH(aq) is completely neutralized by 20.0 mL of 0.200 mol/L HCl(aq). The concentration of the NaOH(aq), to the nearest thousandth, is ____ mol/L.**

ANSWER _____

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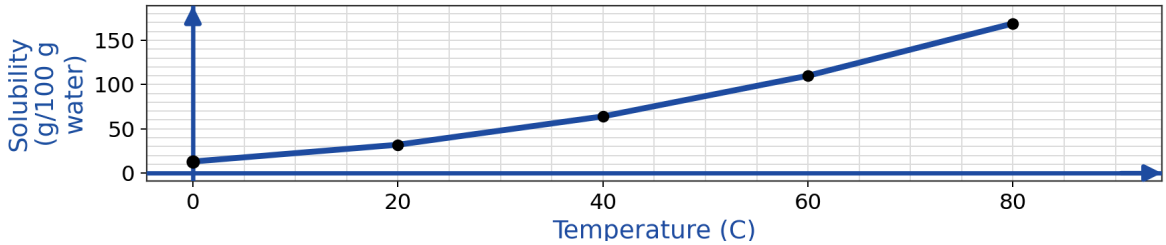
15 **The solubility curve below shows the solubility of potassium nitrate in water. What is the solubility at 40°C?**



A 32 g/100 g water

B 64 g/100 g water

C 110 g/100 g water

D 169 g/100 g water

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16 **A student dissolves 5.85 g of NaCl(s), molar mass 58.44 g/mol, in enough water to make 500 mL of solution. The concentration of the solution, to the nearest hundredth, is ____ mol/L.**

ANSWER _____

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17 **Which procedure correctly describes how to prepare a standard solution from a solid solute?**

A. Weigh the solute, dissolve it in a small volume of distilled water in a beaker, transfer the solution and all rinsings to a volumetric flask, then add distilled water to the calibration mark and mix thoroughly

B. Fill a volumetric flask to the calibration mark with distilled water, then add the weighed solute and stir until it dissolves

C. Weigh the solute directly into a volumetric flask, add distilled water to the calibration mark, and shake until the solid disappears

D. Dissolve the solute in exactly the final volume of water, measured with a graduated cylinder

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18 **A 50.0 mL sample of a 3.0 mol/L solution is diluted with water to produce a 0.50 mol/L solution. The volume of water, in millilitres, that must be added is ____**

ANSWER _____

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19 **Hydrochloric acid and ethanoic acid solutions are both 0.10 mol/L. The HCl(aq) conducts electricity much better than the ethanoic acid mainly because**

A ethanoic acid does not dissolve in water

B HCl ionizes completely, producing a higher concentration of ions

C ethanoic acid has a larger molar mass than HCl

D HCl contains more hydrogen atoms per molecule than ethanoic acid

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20 **The amount of NaOH(aq), in moles, required to completely neutralize 250.0 mL of 0.40 mol/L HNO_3(aq), to the nearest hundredth of a mole, is ____**

ANSWER _____

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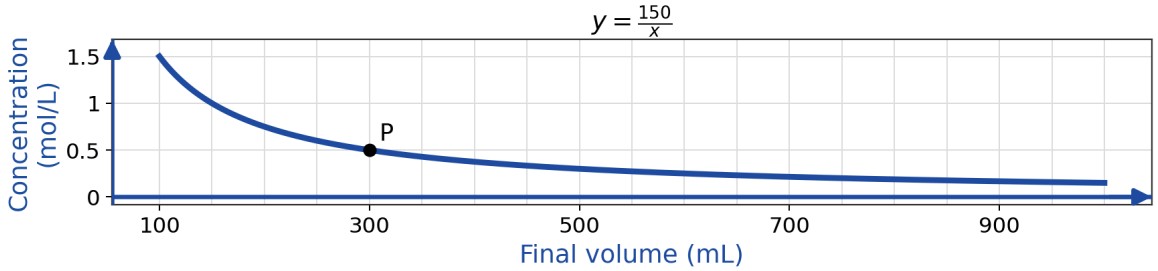
21 **The graph below shows the concentration of a solution as it is diluted to different final volumes, with the amount of solute kept constant. What is the concentration when the final volume is 300 mL?**



A 0.25 mol/L

B 0.50 mol/L

C 1.0 mol/L

D 1.5 mol/L

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22 **A 250.0 mL sample of 0.100 mol/L solution is to be prepared by diluting a 1.50 mol/L stock solution. The volume of stock solution required, to the nearest tenth of a millilitre, is ____ mL.**

ANSWER _____

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23 **Which of the following solutions is the most concentrated?**

- **A** 0.10 mol of solute in 500 mL
- **B** 0.30 mol of solute in 2.0 L
- **C** 0.050 mol of solute in 100 mL
- **D** 0.90 mol of solute in 1.5 L

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24 **According to the modified Arrhenius theory, an acid is a substance that**

- **A** reacts with water to produce $H_3O^+(aq)$ ions
- **B** reacts with water to produce $OH^-(aq)$ ions
- **C** neutralizes hydronium ions in solution
- **D** always contains hydroxide ions in its formula

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25 **In a titration, 25.0 mL of 0.10 mol/L HCl(aq) is required to completely neutralize 20.0 mL of NaOH(aq). The concentration of the NaOH(aq) is**

A 0.080 mol/L

B 0.125 mol/L

C 0.20 mol/L

D 0.25 mol/L

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ANSWER KEY

1. A
2. C
3. B
4. D
5. A
6. C
7. B
8. 0.6
9. D
10. B
11. B
12. 5
13. C
14. 0.16
15. B
16. 0.2
17. A
18. 250
19. B
20. 0.1
21. B
22. 16.7
23. D
24. A
25. B

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