

TOPIC 14. REVISION TUTORIAL.

This revision tutorial includes a self-assessment component intended to provide an indication of those sections where you might benefit from further study. Work through the questions **without consulting your notes**. After the Tutor has explained the answers to each section, assign yourself a score as indicated at the beginning of the question and plot it on the grid provided on the final page to give an overall profile of your progress in the various topics.

QUESTION 1. SYMBOLS AND FORMULAS.

1 mark for each answer

(a) Give the symbol for the following elements:

- | | |
|-----------------|--------------|
| (i) sodium | (ii) calcium |
| (iii) strontium | (iv) boron |
| (v) lead | (vi) sulfur |
| (vii) fluorine | (viii) argon |
| (ix) copper | (x) iron |

(b) Give the name for each of the following elements:

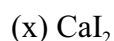
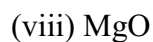
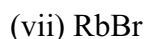
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|----------|-----------|
| (i) K | (ii) Be |
| (iii) Al | (iv) Si |
| (v) P | (vi) As |
| (vii) I | (viii) He |
| (ix) Co | (x) Mn |

(c) Give the formula for each of the following compounds:

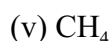
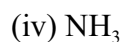
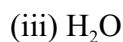
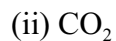
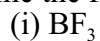
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|---------------------------|----------------------------|
| (i) calcium oxide | (ii) sodium bromide |
| (iii) aluminium nitrate | (iv) magnesium nitride |
| (v) lithium phosphate | (vi) ammonium sulfate |
| (vii) iron(II) sulfide | (viii) iron(III) oxide |
| (ix) copper(II) carbonate | (x) chromium(III) chloride |

(d) Give the name for each of the following compounds:

- | | |
|----------------------------------|----------------------|
| (i) KF | (ii) ZnCl_2 |
| (iii) $\text{Fe}(\text{NO}_3)_3$ | (iv) CuSO_4 |



(e) Name the following covalent compounds:



(f) Give the formula for the following covalent molecules:

(i) sulfur(VI) fluoride

(ii) phosphorus trichloride

(iii) nitrogen dioxide

(iv) dinitrogen pentoxide

(v) silicon tetrachloride

SCORE / 50: \div 5 = Transfer to graph on the final page.

QUESTION 2. **ATOMIC STRUCTURE AND CHEMICAL BONDS.**

4 marks for each answer.

(a) Explain the meaning each of the following terms:

(i) atomic number

(ii) ground state

(iii) cation

(iv) anion

(v) ionic bond

(vi) covalent bond

(vii) unsaturated molecule

(b) What type of bond is expected to be present in a compound of a metal and a non-metal?

(c) What type of bond is expected to be present in a compound of two non-metals?

(d) Why do Group 1 elements form +1 charged ions in their compounds?

(e) Why do the halogens (Group 17) form -1 charged ions in their ionic compounds?

SCORE / 44: \div 4.4 = Transfer to graph on the back page.

QUESTION 3. **WRITING EQUATIONS.**

4 Marks for each equation.

(a) Write a **formula equation** for each of the following reactions:

(i) Carbon is burnt in oxygen to form carbon dioxide.

(ii) Magnesium metal combines with chlorine to form magnesium chloride.

(iii) Calcium carbonate is heated to form calcium oxide and carbon dioxide.

(iv) Hydrogen and oxygen combine to form water

(v) Sulfur combines with fluorine to form sulfur hexafluoride

(b) Write an **ionic equation** for each of the following reactions. Delete all spectator ions from your final equation.

(i) Potassium chloride is dissolved in water.

(ii) A solution of barium nitrate is evaporated to form solid barium nitrate.

(iii) Water solutions of silver nitrate and sodium chloride are mixed to precipitate silver chloride solid.

(iv) Water solutions of barium chloride and sodium sulfate are mixed, precipitating barium sulfate solid.

(v) Calcium oxide is mixed with hydrochloric acid to form a salt in solution and water.

SCORE / 40: ÷ 4 = Transfer to graph on the back page.

QUESTION 4. **MOLES.**

10 Marks for each answer.

(a) What is the mass of 4.50 mole of neon?
(Atomic weight: Ne = 20.2)

(b) How many moles of H₂O are present in 36.0 g of water?
(Atomic weights: H = 1.01, O = 16.0)

(c) What is the mass of 1 mole of sodium chloride?
(Atomic weights: Na = 23.0, Cl = 35.5)

(d) How many moles of O₂ are present in 8.00g of oxygen gas?
(Atomic weight: O = 16.0)

(e) Which is heavier, 4.00 mole of H₂ gas or 0.500 mole of He gas, and by how much?
(Atomic weights: H = 1.01, He = 4.00)

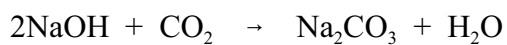
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QUESTION 5. **STOICHIOMETRIC AND SOLUTION CALCULATIONS.**

10 marks for each of (a) and (b).

(a) What mass of carbon would combine exactly with 32.0 g of O₂ gas to form CO₂ gas?
(Atomic weights: C = 12.0, O = 16.0)

(b) Sodium hydroxide combines with carbon dioxide to produce sodium carbonate and water according to the following molecular equation:



Calculate the mass of sodium hydroxide required to prepare 53.0 g of sodium carbonate.
(Atomic Weights: Na = 22.99, C = 12.00, O = 16.00, H = 1.01)

10 marks for each answer in part (c).

(c) (i) Calculate the amount in moles of sodium chloride required to make 0.50 L of 0.10 M solution.

(ii) What volume of 2.0 M sodium sulfate solution would contain 0.50 mole of sulfate ions?

(iii) In order to prepare 1.00 L of 0.40 M sodium nitrate, what mass of sodium nitrate must be weighed out? (Atomic weights: Na = 22.99, N = 14.01, O = 16.00)

SCORE / 50 ÷ 5 = Transfer to graph on the back page.

QUESTION 6. PERIODIC TABLE.

3 marks for each part (a) - (d).

(a) Give the symbols for the first 5 elements of periodic Group 1:

.....

(b) Give the names of the first four elements of periodic Group 17 (halogens)

.....

(c) Where in the periodic table are the most non-metallic elements located?

(d) Where in the Periodic Table are the elements which are (i) most easily oxidized (ii) most easily reduced?

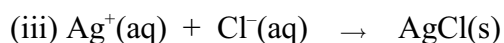
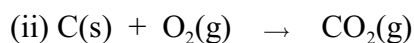
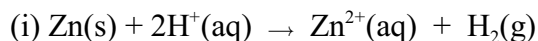
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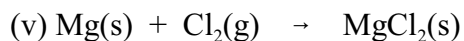
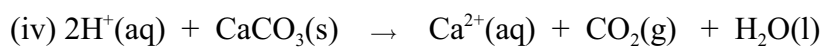
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QUESTION 7. REDOX.

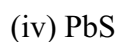
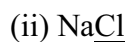
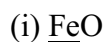
2 marks for each answer in (a) and (b).

(a) Write "redox" beside all of the following reactions that are redox reactions.



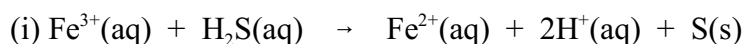
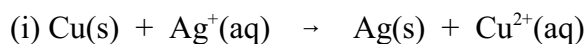


(b) Give the oxidation number for the underlined atom in each of the following:



6 marks for each part of (c)

(c) Balance the following redox equations using the ion-electron half equation method. Indicate for each half equation whether it is an oxidation or a reduction.



SCORE / 30: ÷ 3 = Transfer to graph on the back page.

QUESTION 8. **ACIDS AND BASES.**

(a) **2 marks for each answer.** Give the formula for the following species:

(i) the conjugate acid of NO₃⁻

(ii) the conjugate base of NH₄⁺

(iii) the conjugate acid of Cl⁻

(iv) the conjugate base of H₂O

5 marks for each answer in parts (b), (c) and (d)

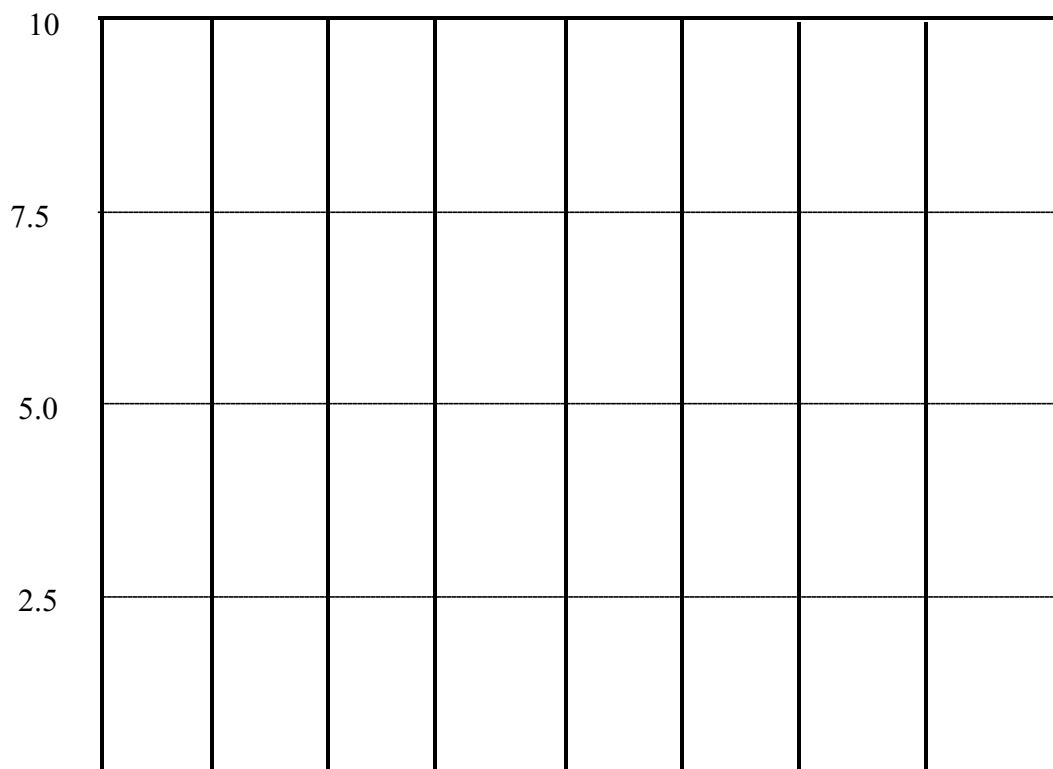
(b) Calculate the pH of 0.10 M nitric acid in water.

(c) Calculate the concentration of H₃O⁺ ions in a solution of pH = 3.60.

(d) Calculate the pH of a 0.10 M solution of sodium hydroxide in water.

SCORE / 23: ÷ 2.3 = Transfer to graph on the back page.

Symbols & Formulas Structure & Bonding Equations Moles Stoich. Calcs. Periodic Table Redox Acid-Base



Enter your result for each section in the above graph to obtain a profile of your progress in each area covered by the course.

A worked copy of these questions can be accessed on the downloads page www.chemlab.chem.usyd.edu.au/download.htm