

Chemistry

TOPIC 1: MATTER

TOPIC 2: ATOMS, ELEMENTS, COMPOUNDS AND MIXTURES

Page 81, SEC Exam Paper 2019, Q.4

Question 4

- (a) 1,4,4, (3)
 (b) Equal number of atoms on each side of reaction (6)
 (c) Particles remain the same / no new substance formed in a physical change (6)

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Question 15

- (d) The particles are all the same (3)
 (e) Aluminium (3)
 The particles are packed close together. (3)

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Question 6

- A: Solid (2)
 B: Gas, Compound (2,2)
 C: Liquid, Compound (2,2)
 D: Element (2)
 E: Gas, Mixture (2,1)

TOPIC 4: STRUCTURE OF THE ATOM

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Question 8

- (a) Proton
 Electron
 Neutron (2,2,2)

TOPIC 5: THE PERIODIC TABLE

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Question 15

- (a) Nitrogen / oxygen / argon / neon (3)
 (b) Availability is seriously threatened in the next 100 years (3)

- (c) Recycle / upgrade less often / repair or reuse old phones (3)
 (g) (i) 1; Justify: can conduct electricity / high melting and boiling point (3) + (3)
 (ii) 2; Justify: melting point is below room temp of 20°C / boiling point is above room temperature (3) + (6)

TOPIC 6: CHEMICAL FORMULA AND CHEMICAL BONDING

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Question 15

- (f) Aluminium in group 3 or 13 (3)
 Chlorine in group 7 or 17 (3)
 Ratio: Al:Cl = 1:3 (3)
 [Award 9 marks for correct ratio without formula]
 AlCl₃ (3)
 [Award 12 marks for correct formula]

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Question 8

- (a) Magnesium Chloride ratio 1:2 Formula MgCl₂
 Ammonia ratio 1:3 Formula NH₃ (2,2,2,3)

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Question 19

- (c) (i) Magnesium – B
 Nitrogen – A/C
 Phosphorus – D
 Potassium – C
 (ii) Three (nitrogen, hydrogen and oxygen)

TOPIC 7: PROPERTIES OF MATERIALS

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Question 11

- (a) Any valid hypothesis, e.g. the boiling point of water will increase when salt is added (3)
 (b) The temperature at which a liquid turns to vapour throughout (3)
 (c) Electronic balance / scales (3)
 (d) A container (3)
 Source of heat (3)
 thermometer in or above container (3)
 [Deduct 3 marks if no labels are shown]
 (e) 105
 (f) To improve reliability (3)
 (g) Yes / no linked to the hypothesis (3,3)

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Question 11

(a) Any valid description e.g. (12)

Materials:

Weigh boat

Electronic balance

Spatula

Citric acid

250ml graduated cylinder

Distilled water

250ml beaker

Stirring rod

Procedure:

- Place a beaker or weigh boat on the electronic balance and press the zero button.
- Add 5g of citric acid to the weigh boat using a spatula.
- Use a graduated cylinder to measure 100ml of distilled water.
- Add the 100ml of distilled water to a beaker.
- Add the 5g of citric acid to the water.
- Stir using a stirring rod.
- Diagram to illustrate apparatus

TOPIC 8: CHEMICAL REACTIONS

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Question 11

(a) Endothermic.

Explanation: the test tube cools down as heat energy is taken in from the surroundings during the reaction. (6)

Page 109 – 110, SEC Sample Exam Paper 2018, Q.15

Question 15

(a) Carbon dioxide / oxygen (3)

(b) Diagram for either. Carbon dioxide = hydrochloric acid and marble chips.
Oxygen = hydrogen peroxide and manganese dioxide. (12)

(c) Carbon dioxide: it will extinguish a lit flame or turn limewater a milky colour.
Oxygen will relight a glowing splint. (6)

(d) Graph (12)

(e) Conclusion 1: The rate of reaction is faster at 30°C (6)

Conclusion 2: Both reactions are complete after 150 seconds (6)

Page 111, NCCA Sample Questions, Q.17

Question 17

(a) A factor / factors that will change in an investigation.

(b) To make it a fair test.

(c) B, it has the lowest rate of reaction / least amount of carbon dioxide produced.

(d) Different particle size / different mass. A has a smaller particle size / greater mass and a resulting faster rate of reaction than D.

(e) C

TOPIC 9: ACIDS AND BASES

Page 115, SEC Exam Paper 2019, Q.6

Question 6

- (a) Methyl orange / litmus / universal indicator (3)
- (b) Red / red / red, orange, yellow correct colour linked to indicator (3)
- (c) 7 (3)
- (d) Exothermic (3)
- (e) Arrow in the bump from top of bump to the base at level of reactants' line (3)

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Question 11

- (c) pH increase. Explanation: citric acid is an acid so it has a pH below 7, baking soda is a base, when it is added to the citric acid it will neutralise it and cause the pH to increase to 7. (6)
- (d) Using a pH probe or indicator solution or paper. Insert the probe or indicator solution or paper to the citric acid solution and record the pH. Add a little baking soda at a time and record the pH changes. (6)

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Questions

- (i) Any valid outline of an investigation. For example
- Materials*
- 21 hydrangea flowers on the stem
- 21 containers for water
- pH buffers at pH 1 – 6 or water at these different pH values
- Tap water
- Cause variable:* pH of the water
- Effect variable:* Colour of the hydrangea flower
- Constants:* same hydrangea plant, same temperature, same amount of water in each beaker, same time given.

Procedure

- Cut 21 equal size sprigs of hydrangea flowers.
- Label three beakers pH 1, three beakers pH 2 etc up to pH 7 Tap water. Each pH is tested three times to ensure a fair test.
- Add pH buffers to the labelled beakers.
- Add one sprig of hydrangea to each beaker.
- Leave flowers in the beakers for 4 days.
- Record any colour changes in the flowers.

Results table

pH of water	1	2	3	4	5	6	Tap water (pH7)
Colour of hydrangea flowers after 4 days	Blue	Blue	Blue	Blue	Blue	Blue	Pink

Conclusion:

Hydrangea flowers placed in acidic solutions turned blue and hydrangea flowers placed in a neutral solution of tap water turned pink. The pH of the water affects the colour of hydrangea flowers.

- (ii) pH 1 – 6; Justify: acids have a pH below 7

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Question

- (a) (i) Carbon dioxide
(ii) It turned the indicator red and it took the most drops of alkaline solution to change the solution to neutral.
(iii) Air
(iv) It did not change the colour of the indicator from green (neutral).
(v) Using indicator paper or a pH probe.

TOPIC 10: SUSTAINABILITY OF MATERIALS

Page 120, NCCA Sample Questions, Q.9

Question 9

- Extraction: Plastic bags are made from oil. Oil extraction causes pollution to the land and oceans. Oil is non renewable. Paper bags are made from wood which is renewable.
- Manufacturing: Plastic bags require less energy than paper bags to produce. Plastic bags produce more carbon dioxide during their lifecycle than paper bags. Plastic = 540 g CO₂ v paper = 240g CO₂.
- Use: Plastic bags may last a little longer than paper bags but both are generally single use.
- Disposal: Plastic bags produce less solid waste than paper bags but plastic is not biodegradable. Paper bags biodegrade completely in a few weeks.
- Recycle: Most plastic bags are not recyclable, paper is recyclable. Paper bags have the least impact on the environment.

SAMPLE