3.17 Chemistry: Metals, the Reactivity Series and Environmental Chemistry: 1-hour Pack

ISEB CE 13+ Science (Chemistry) · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 State the name of the gas that is essential for combustion and is found in air at about 21%.

(1)

2 Which of these metals is the MOST reactive?

- ☐ A) copper
- ☐ B) potassium
- ☐ C) lead
- ☐ D) aluminium
- ☐ E) magnesium

3 Name the process by which water vapour cools and forms dew on grass.

(1)

4 Which of these metals is the MOST reactive?

- ☐ A) silver
- ☐ B) zinc
- ☐ C) aluminium
- ☐ D) sodium
- ☐ E) magnesium

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5 Name the process by which water vapour cools on a mirror and forms a liquid layer.

(1)

6 Copper(II) oxide is reduced by hydrogen gas to form copper. Name this type of reaction.

(1)

7 Which of these metals is the LEAST reactive?

- ☐ A) magnesium
- ☐ B) potassium
- ☐ C) gold
- ☐ D) sodium
- ☐ E) copper

8 A piece of iron is placed in a solution of copper sulfate. Blue crystals turn pink as red copper metal forms on the iron surface. Name the red crystals deposited on the iron.

(1)

9 Which of these metals is the LEAST reactive?

- ☐ A) aluminium
- ☐ B) sodium
- ☐ C) lead
- ☐ D) gold
- ☐ E) potassium

10 Magnesium reacts with copper(II) oxide to produce magnesium oxide and copper. State the type of reaction.

(1)

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11 Which of these metals is the MOST reactive?

- ☐ A) magnesium
- ☐ B) potassium
- ☐ C) iron
- ☐ D) silver
- ☐ E) aluminium

---

12 A lake contains 8,000,000 m^3 of water at the start of a dry period. If evaporation causes the volume to fall by 12%, calculate the volume remaining.

(1)

---

13 Which of these metals is the MOST reactive?

- ☐ A) potassium
- ☐ B) lead
- ☐ C) sodium
- ☐ D) silver
- ☐ E) zinc

---

14 Name the two main processes by which loose sediment is converted into hard, solid rock.

(1)

---

15 Which of these metals is the MOST reactive?

- ☐ A) calcium
- ☐ B) sodium
- ☐ C) magnesium
- ☐ D) zinc
- ☐ E) potassium

---

16 State the method used to extract metals above carbon in the reactivity series from their ores.

(1)

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17 Which of these metals is the MOST reactive?

- ☐ A) aluminium
- ☐ B) calcium
- ☐ C) potassium
- ☐ D) silver
- ☐ E) lead

---

18 Which of these metals is the LEAST reactive?

- ☐ A) magnesium
- ☐ B) iron
- ☐ C) lead
- ☐ D) zinc
- ☐ E) sodium

---

19 A pond holds 3,000,000 m^3 of water. During a hot summer, 25% evaporates. Calculate the volume remaining.

(1)

---

20 Which of these metals is the MOST reactive?

- ☐ A) silver
- ☐ B) aluminium
- ☐ C) gold
- ☐ D) copper
- ☐ E) calcium

---

21 Which of these metals is the MOST reactive?

- ☐ A) potassium
- ☐ B) gold
- ☐ C) iron
- ☐ D) silver
- ☐ E) copper

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22 A coil of clean magnesium wire is placed into a colourless solution of iron(III) chloride. Grey-black crystals form on the surface of the wire and the solution turns pale yellow. Name the grey-black crystals.

(1)

23 Which of these metals is the MOST reactive?

- ☐ A) gold
- ☐ B) lead
- ☐ C) silver
- ☐ D) calcium
- ☐ E) zinc

24 A water storage tank contains 2,500,000 m^3. During a drought, 20% evaporates. Calculate the volume lost.

(1)

25 Which of these metals is the MOST reactive?

- ☐ A) copper
- ☐ B) calcium
- ☐ C) aluminium
- ☐ D) zinc
- ☐ E) magnesium

26 State the name of the third most abundant gas in clean, dry air.

(1)

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27 Which of these metals is the MOST reactive?

- ☐ A) potassium
- ☐ B) gold
- ☐ C) copper
- ☐ D) magnesium
- ☐ E) sodium

---

28 State the name of the process by which sediment particles are carried away by wind from a weathered rock.

(1)

---

29 Which of these metals is the LEAST reactive?

- ☐ A) potassium
- ☐ B) calcium
- ☐ C) zinc
- ☐ D) silver
- ☐ E) iron

---

30 A lake holds 5,400,000 m^3 of water at the start of a dry summer. Evaporation causes the volume to fall by 12%, with no rain. Calculate the volume remaining at the end of the month.

(1)

---

31 Which of these metals is the MOST reactive?

- ☐ A) lead
- ☐ B) magnesium
- ☐ C) silver
- ☐ D) aluminium
- ☐ E) gold

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32 Which of these metals is the MOST reactive?

- ☐ A) gold
- ☐ B) copper
- ☐ C) calcium
- ☐ D) iron
- ☐ E) lead

---

33 Clean, dry air is approximately 78% nitrogen, 21% oxygen, 0.9% argon and 0.04% carbon dioxide, by volume, with tiny amounts of other gases.

(a) State the name of the most abundant gas in the air. **(1)**

(b) A sample of clean, dry air has a volume of 600 cm^3. Calculate the volume of oxygen in this sample. **(2)**

.....

(c) Calculate the volume of carbon dioxide in the same 600 cm^3 sample of air. **(2)**

.....

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34 Which of these metals is the LEAST reactive?

- ☐ A) iron
- ☐ B) lead
- ☐ C) calcium
- ☐ D) copper
- ☐ E) gold

---

35 In the thermite reaction, powdered aluminium reacts with iron oxide to produce molten iron and aluminium oxide. State the type of reaction.

(1)

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36 Which of these metals is the MOST reactive?

- ☐ A) potassium
- ☐ B) gold
- ☐ C) zinc
- ☐ D) aluminium
- ☐ E) magnesium

---

37 A water storage tank contains 2,500,000 m^3. During a drought, 20% evaporates. Calculate the volume remaining.

(1)

---

38 Which of these metals is the MOST reactive?

- ☐ A) silver
- ☐ B) sodium
- ☐ C) gold
- ☐ D) potassium
- ☐ E) calcium

---

39 State the two substances needed for aluminium to corrode.

(1)

---

40 Which of these metals is the MOST reactive?

- ☐ A) magnesium
- ☐ B) copper
- ☐ C) silver
- ☐ D) calcium
- ☐ E) potassium

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41 A pond contains 500,000 m^3 of water at the start of summer. Over the season, evaporation causes the volume to fall by 20%, with no rainfall to replace it. Calculate the volume of water lost by evaporation.

(1)

---

42 Which of these metals would displace iron from a solution of one of its salts?

- ☐ A) lead
- ☐ B) silver
- ☐ C) magnesium
- ☐ D) copper
- ☐ E) gold

---

43 Powdered zinc reacts with iron oxide to produce molten iron and zinc oxide. This highly exothermic reaction is used in industry.
zinc + iron oxide -> zinc oxide + iron
State the type of reaction.

(1)

---

44 Which of these metals is the LEAST reactive?

- ☐ A) sodium
- ☐ B) silver
- ☐ C) potassium
- ☐ D) lead
- ☐ E) zinc

---

45 Name the process by which liquid water on a puddle changes into water vapour on a sunny day.

(1)

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46 Which of these metals is the MOST reactive?

- ☐ A) zinc
- ☐ B) lead
- ☐ C) magnesium
- ☐ D) iron
- ☐ E) sodium

---

47 State the two substances that must be present for aluminium to corrode.

(1)

---

48 Which of these metals is the LEAST reactive?

- ☐ A) gold
- ☐ B) aluminium
- ☐ C) silver
- ☐ D) calcium
- ☐ E) copper

---

49 Name the process by which water vapour changes back to liquid water on a cold window pane.

(1)

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50 Which of these metals is the LEAST reactive?

- ☐ A) magnesium
- ☐ B) silver
- ☐ C) sodium
- ☐ D) aluminium
- ☐ E) zinc

---

51 A lake contains 8,000,000 m^3 of water at the start of a dry period. If evaporation causes the volume to fall by 12%, calculate the volume of water lost.

(1)

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52 Which of these metals is the LEAST reactive?

- ☐ A) potassium
- ☐ B) iron
- ☐ C) gold
- ☐ D) silver
- ☐ E) copper

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53 Burning fossil fuels also releases gases into the atmosphere that are linked to global warming (the enhanced greenhouse effect).

(a) Name the gas released when fossil fuels burn that is the main gas linked to global warming. **(1)**

(b) Explain, in terms of energy, how carbon dioxide in the atmosphere contributes to global warming. **(2)**

(c) Suggest one way that carbon dioxide emissions from human activity could be reduced. **(1)**

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54 Metals and non-metals differ in many of their typical physical properties, although there are some exceptions.

(a) State one physical property, other than appearance, that is typical of most metals. **(1)**

(b) State one physical property, other than being a poor conductor, that is typical of most non-metals when solid. **(1)**

(c) Give the name of a non-metal that is an exception, because it is a good conductor of electricity. **(1)**

(d) Give the name of a metal that is an exception, because it is not a solid at room temperature. **(1)**

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Mark scheme · 3.17 Chemistry: Metals, the Reactivity Series and Environmental Chemistry: 1-hour Pack

Question 1

Oxygen (oe) **B1**

Answer: Oxygen

Question 2

B (potassium) **B1**

Answer: B) potassium

Question 3

Condensation (oe) **B1**

Answer: Condensation

Question 4

D (sodium) **B1**

Answer: D) sodium

Question 5

Condensation (oe) **B1**

Answer: Condensation

Question 6

Reduction (oe) **B1**

Answer: Reduction

Question 7

C (gold) **B1**

Answer: C) gold

Question 8

Copper (oe) **B1**

Answer: Copper

Question 9

D (gold) **B1**

Answer: D) gold

Question 10

A displacement reaction (oe) **B1**

Answer: A displacement reaction

Question 11

B (potassium) **B1**

Answer: B) potassium

Question 12

7,040,000 m³ (oe) **B1**

Answer: 7,040,000 m^3

Question 13

A (potassium) **B1**

Answer: A) potassium

Question 14

Compaction and cementation (oe) **B1**

Answer: Compaction and cementation

Question 15

E (potassium) **B1**

Answer: E) potassium

Question 16

Electrolysis (oe) **B1**

Answer: Electrolysis

Question 17

C (potassium) **B1**

Answer: C) potassium

Question 18

C (lead) **B1**

Answer: C) lead

Question 19

2,250,000 m³ (oe) **B1**

Answer: 2,250,000 m^3

Question 20

E (calcium) **B1**

Answer: E) calcium

Question 21

A (potassium) **B1**

Answer: A) potassium

Question 22

Iron (oe) **B1**

Answer: Iron

Question 23

D (calcium) **B1**

Answer: D) calcium

Question 24

500,000 m³ (oe) **B1**

Answer: 500,000 m^3

Question 25

B (calcium) **B1**

Answer: B) calcium

Question 26

Argon (oe) **B1**

Answer: Argon

Question 27

A (potassium) **B1**

Answer: A) potassium

Question 28

Erosion (transportation) (oe) **B1**

Answer: Erosion (transportation)

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Question 29

D (silver) **B1**

Answer: D) silver

Question 30

4,752,000 m³ (oe) **B1**

Answer: 4,752,000 m^3

Question 31

B (magnesium) **B1**

Answer: B) magnesium

Question 32

C (calcium) **B1**

Answer: C) calcium

Question 33

(a) nitrogen, cao **B1**

(a) Answer: Nitrogen.

(b) 600 x 0.21, oe **M1**

(b) 126 cm³, cao **A1**

(b) Answer: 126 cm^3

(c) 600 x 0.0004, oe **M1**

(c) 0.24 cm³, cao **A1**

(c) Answer: 0.24 cm^3

Question 34

E (gold) **B1**

Answer: E) gold

Question 35

A displacement reaction (oe); accept redox **B1**

Answer: A displacement reaction

Question 36

A (potassium) **B1**

Answer: A) potassium

Question 37

2,000,000 m³ (oe) **B1**

Answer: 2,000,000 m^3

Question 38

D (potassium) **B1**

Answer: D) potassium

Question 39

Oxygen and water (oe) **B1**

Answer: Oxygen and water

Question 40

E (potassium) **B1**

Answer: E) potassium

Question 41

100,000 m³ (oe) **B1**

Answer: 100,000 m^3

Question 42

C (magnesium) **B1**

Answer: C) magnesium

Question 43

A displacement reaction (oe) **B1**

Answer: A displacement reaction

Question 44

B (silver) **B1**

Answer: B) silver

Question 45

Evaporation (oe) **B1**

Answer: Evaporation

Question 46

E (sodium) **B1**

Answer: E) sodium

Question 47

Oxygen and water (oe) **B1**

Answer: Oxygen and water

Question 48

A (gold) **B1**

Answer: A) gold

Question 49

Condensation (oe) **B1**

Answer: Condensation

Question 50

B (silver) **B1**

Answer: B) silver

Question 51

960,000 m³ (oe) **B1**

Answer: 960,000 m^3

Question 52

C (gold) **B1**

Answer: C) gold

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Question 53

(a) carbon dioxide, cao **B1**

(a) Answer: Carbon dioxide.

(b) carbon dioxide (a greenhouse gas) absorbs heat energy (infrared radiation) radiated from the Earth's surface, oe **B1**

(b) and re-radiates some of this energy back towards the Earth, increasing the average temperature of the atmosphere, oe **B1**

(b) Answer: Carbon dioxide absorbs heat energy radiated from the Earth's surface and re-radiates some of it back towards the Earth, trapping extra energy and increasing the average temperature.

(c) any sensible suggestion, e.g. using renewable energy sources instead of fossil fuels, improving energy efficiency, planting more trees, using public transport/electric vehicles, oe **B1**

(c) Answer: Example: generating more electricity from renewable sources, such as wind or solar, instead of burning fossil fuels.

Question 54

(a) any one of: good conductor of electricity, good conductor of heat, malleable, ductile, sonorous (makes a ringing sound), high density, high melting/boiling point, oe **B1**

(a) Answer: Example: metals are good conductors of electricity.

(b) any one of: brittle, dull, low density, low melting/boiling point, oe **B1**

(b) Answer: Example: most solid non-metals are brittle.

(c) carbon (graphite), cao **B1**

(c) Answer: Carbon, in the form of graphite.

(d) mercury, cao **B1**

(d) Answer: Mercury.

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