

(Electrolysis (including of aqueous solutions, half-equations))

Q1. (2018)

solid (zinc chloride) does not
conduct (electricity)

or

zinc chloride needs to be in
solution **or** molten

(because) ions cannot move in
the solid

or

(as) ions can (only) move in
liquid / solution

Q2. a). (2018)

use measuring cylinders
(instead of test tubes)

(because) test tubes cannot
measure volume

or

(because) test tubes have no
graduations / scale

Q2.b). (2018)

- the volume of hydrogen collected is directly proportional to the time
- the rate of collection of hydrogen is $0.45 \text{ (cm}^3\text{/min)}$
- up to 8 minutes chlorine is collected at an increasing rate
- after 8 minutes the rate of collection of chlorine is the same as that of hydrogen
or
after 8 minutes the rate of collection of chlorine is $0.45 \text{ (cm}^3\text{/min)}$

Q2. c). (2018)

chlorine reacts with water

or

chlorine dissolves (in the solution)

Q2. d). (2018)

$$(\text{volume}) = \frac{6.6}{1000} \text{ (dm}^3\text{)}$$

or $0.0066 \text{ (dm}^3\text{)}$

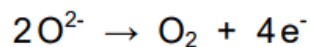
$$(\text{moles}) = \frac{0.0066}{24}$$

$$= 2.75 \times 10^{-4} \text{ (mol)}$$

Q3. (2019)

aluminium ions gain electrons

Q4. (2019)



Q5. (2019)

hydrogen (gas) would be
produced (instead of sodium)

(because) sodium is more
reactive than hydrogen

Q6. (2020)

CrO_4^{2-} / chromate ions moved to
the positive electrode

(because) opposite charges
attract

Q7. (2020)

water

Q8. (2020)

copper ions gain two electrons

(to) form copper (atoms)

Q9. (2020)

(negative electrode) hydrogen

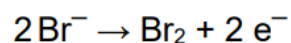
(positive electrode) iodine

Q10. (2021)

electrolysis uses electricity to
produce a chemical reaction

(but) cells use a chemical
reaction to produce electricity

Q11. (2021)



Q12. (2021)

Salt solution	Product at positive electrode	Product at negative electrode
(copper nitrate)	oxygen (1)	(copper)
(potassium iodide)	iodine (1)	hydrogen (1)

Q13. a). (2021)

filter the mixture

wash and dry the copper /
residue

weigh the copper collected

add to the increase in mass of
the electrode

Q13. b). (2021)

(for given current) straight line
through the origin

Q13. c). (2021)

(for given time) when current
doubles, mass doubles with
supporting data

Q13. d). (2021)

$$(\text{number of moles} = \frac{0.24}{63.5} =)$$

$$3.78 \times 10^{-3} \text{ or } 0.00378$$

(number of atoms =)

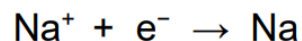
$$0.00378 \times 6.02 \times 10^{23}$$

$$= 2.28 \times 10^{21}$$

Q14. (2021)

copper ions are discharged
(from the solution)

Q15. a). (2022)



Q15. b). (2022)

so the products do not react (to
reform sodium chloride)

Q15. c). (2022)

ion

Q16. a). (2022)

hydrogen / H^+ (ions)

hydroxide / OH^- (ions)

Q16. b). (2022)

sodium hydroxide

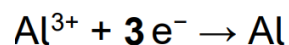
Q16. c). (2022)

sodium ions and hydroxide ions
are left (in solution)

(because) hydrogen ions are
discharged / reduced (at the
negative electrode to form
hydrogen)

(and because) chloride ions are
discharged / oxidised (at the
positive electrode to form
chlorine)

Q17. (2023)



Q18. a). (2023)

water (molecules) break down

(to) produce (H^{+} and) OH^{-} (ions)

(so) OH^{-} (ions) are attracted /
move to the positive electrode

(where) OH^{-} (ions) are
discharged / oxidised to give
oxygen (molecules)

Q18. b). (2023)

(change)
use measuring cylinders
(instead of test tubes)

(reason)
because there is a scale (on the
measuring cylinders)

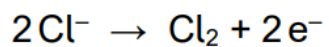
Q19. (2024)

the ions cannot move

Q20. (2024)

hydrogen

Q21. (2024)



Q22. (2024)

Cu^{2+} / copper ions are blue

and

CrO_4^{2-} / chromate ions are
yellow

(because) Cu^{2+} / copper ions
move to the negative electrode

(and also) CrO_4^{2-} / chromate
ions move to the positive
electrode