Mearns Castle HS

**NATIONAL 5 CHEMISTRY**

Unit 3

Chemistry in Society

ANSWERS

Exam Questions

**Metals**

1. C (1)

2. B (1)

3. D (1)

4. B (1)

5. C (1)

6. D (1)

7. D (1)

8. D (1)

9. C (1)

10. D (1)

11. D (1)

12. C (1)

13. A (1)

14. A (1)

15. A (1)

16. A (1)

17. D (1)

18. Delocalised (free) electrons (1)

 Electrons are free to move

 Electrons can pass through

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| **19.**  | **(a)**  | d.c. or direct current 1 | Not acceptable :Battery, lab pack  |
|  | **(b)** | Chlorine gas Bubbles of gas Gas given off Fizzing/effervescence Green/yellow gas Cl2(g) 1 |   |

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| **20.**  | **(a)**  | A B On or close to the wires **1** | Not acceptable :Arrow in solution or arrow continues into solution or ion bridge → Negates:Also negates if arrow also drawn on wire correctly.  |
| **(b)** | State symbols not needed. Negative sign on electron not needed.  **1** |   |
| **(c)** | Ion bridge/salt bridge Filter paper soaked in salt solution/electrolyte. **1** | Not acceptable:Ion-electron bridge Electrolyte or bridge on its own.  |

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| **21.**  |  |   **1** |  |

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| **22.**  | **(a)**  | displacement redox **1** | Not acceptable:Oxidation/reduction  |
| **(b) (i)** | B/negative **1** |   |
| **(b) (ii)** | As per data booklet, ignore state symbols.  **1** |   |

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| **23.**  |  | FM = 232·5 (1) 200·5/232·5 x 100 = 86·2% or 86% (1) 86·2% or 86% on its own 2 marks Use of atomic numbers max 1 mark, must have working to gain the mark, 83·3% Metal other than Hg max 1 mark  |  |

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| **24.**  |  | reduction reduced 1 | Redox Redox and reduction 0 marks(cancelling applies)  |

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| **25.**  |  | 25g **1** |  |

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| **26.**  | **(a)**  | oxidation **1** |  |
| **(b)** | Left to right indicated on or near the wire. **1** |  Not acceptable:if line goes into cell 0 marks  |
| **(c)** | C, graphite, carbon **1** |   |

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| **27.**  | **(a)**  | Can be circled on either side or both sides or identified in some other way  **1** |  |
| **(b)** | Ignore state symbols (-ve sign not needed for e)  **1** |   |
| **(c) (i)** | Zinc copper carbon or any metal below copper in ECS. Zinc sulphate solution/Zn2+(aq) (or any other soluble zinc salt) or a solution containing ions of metals above zinc in ECS.  **1** | **Not acceptable:**Zn2+ on its own or with any other state symbol. Zinc sulphate without solution. Zinc solution.  |
| **(c) (ii)** | To complete/finish the circuit/cell. To allow ions to flow/move/transfer (between the two beakers). To carry the ions (between the two beakers). To provide ions to complete the circuit.  | **Not acceptable:**To transfer ions from zinc to copper To carry the current To conduct electricity To allow electrons to flow through the wire on its own Any mention of electrons on their own Allow electricity to pass through /flow To connect (the) electrolytes To keep (the) circuit flowing To connect the circuit **Negates:**Allow electrons to flow -unless specifically stated through the wire.  |

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| **28.**  | **(a)**  | (metal) 3 0·9 **1** | **Not acceptable:**(Metal) C  |
| **(b)** | (metal) 2 and (metal) 3 0·2 and 0·9 allow for follow through for incorrect answer in (a) (metal) 3 and students answer in (a) **1** | **Not acceptable:**any other combination  |
| **(c)**  | 0/ 0·0 / zero  **1**  | **Not acceptable:**No voltage   |

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| **29.**  |  |  Ignore state symbols Correct symbols to be used **1** | **Not acceptable:**Use of = sign  |

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| **30.** |  | D **1** |  |

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| **31.**  |  | D  **1**  |  |
| **32.** |  | A **1** |  |
| **33.** |  | B  **1** |  |

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**Properties of Plastics**

1. A (1)

2. C (1)

3. B (1)

4. A (1)

5. D (1)

6. D (1)

7. C (1)

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| **8.**  |  | or **1** | **Not acceptable:** |

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| **9.**  |  | Diagram must show three monomer units linked together One end bond missing no penalty **1** | **Not acceptable:**If molecule closed at both ends zero marks.  |

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| **10.**  |  | D **1** |  |

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| **11.**  | (a) |  allow one slip – missing H atom OR missing C – H bond but not C=O or – O – H ignore brackets around correct monomer. **1**   | **Not acceptable:**COOH if expanded must be correct. Repeating unit and monomer shown with no indication of steps involved (professional judgement).  |
| (b) | Polar covalent **1** | **Not acceptable:**Covalent Any reference to networks Hydrogen bonding  |

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| **12.**  | (a) |  both end bonds must be present, dotted lines, squiggles / allow one missing C to F bond/ allow one missing F don’t penalise for size/shape of F must have 6 carbons ignore brackets **1**   | **Not acceptable:**missing C to C bond/ no end bonds Fl Carbon to carbon double bond F at end  |
| (b) | Addition/ additional **1** |   |





15. (a) hydroxyl (1)

 (b)

 Allow shortened formula but must show bonds (1)

 (c) Soluble in water/dissolves (1)

 Breaks down in water

 Degrades in water

 Disintegrates in water

**Fertilisers**

1. C (1)

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| **2.**  | (a) | Arrows drawn from unreacted gases to hydrogen and nitrogen box or catalyst box or between these two  **1**   |  |
|  | (b) (i) | Platinum, Pt **1** |   |
|  | (b) (ii) | It is an exothermic reaction The reaction produces heat **1** |  |

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| **3.**  |  | Speed up reaction, too slow at 200ºC **1**   | **Not acceptable:**Any mention of decomposition Cost **Negates:**Faster & produces more ammonia  |

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| **4.**  |  | FM = 174g (1 mark) 78/174 × 100 = 44.8 (1 mark) 44.8 or 45 on its own 2 marks Using atomic numbers 44% (max 1 mark) 44 must have working If use mass of one potassium max 1 mark If use S or O max 1 mark   | **Not acceptable:**44 on its own zero If use element not in potassium  |



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**Nuclear Chemistry**

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| **1.**  |  |  A |   |

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| **2.**  | (a) |   |   |
|  | (b) | 8 days **1** |  |

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| **3**  | (a) |   **1**Atomic numbers not required- if shown, they must be correct Mass numbers shown top left as in question paper  |   |
|  | (b) |  No effect/no change **1** |  |
|  | (c) | ¼ or 0.25 or 25% **1** |  |







7 (a) time for the activity (or number of nuclei) (of a radioactive source) to reduce

 to half the original number/activity/its value (1)

 (b) Activity 160 to 80 kBq ⇒ 6 hours (1)

 (c)



9. C (1)

10. C (1)

**Chemical Analysis**

1. D (1)

2. C (1)

3. B (1)

4. C (1)

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| **5.**  | (a) |  Indicator/named acid/base indicator pH/universal indicator **1** | **Not acceptable:**Ferroxyl indicator Bicarbonate indicator  |
|  | (b) |  Apply mole ratio0.002 : 0.004 **1** mark0.004 on its own **1** mark  |  |

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| **6.**  |  |  Apply mole ratio 1:1 0·001: 0·001 **1** mark0·001 = c x 0·025 c = 0·04 **1** mark |  |

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| **7.**  | (a) |  16·0/ 16 **1** |  |
| (b) |   **1 mark**   **1 mark**  **1 mark**Or 0·2025 (if 16·2 used) = 0·20/0·203 if rounded Allow follow through for incorrect answer above.  |  |







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**Problem Solving Questions**

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| **1.**  | (a) |  As the percentage increases…the density decreases As the percentage decreases…the density increases Density increases as percentage decreases Density decreases as percentage increases etc **1** | **Not acceptable:**As the density increases percentage decreases eg wrong cause and effect  |
|  | (b) |  20 **1** |  |

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| **2.**  | (a) | Red, pink, orange, yellow **1** |  |
|  | (b) | Line must be increasing Line stops at pH7 or below  **1** |  |

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| **3.**  | (a) | Ionic Ionic lattice Ionic network  **1** | **Not acceptable:**Ionic molecular Lattice on its own Network on its own Sodium to chlorine bonds  |
|  | (b) |  As concentration increases/decreases freezing point decreases/increases The freezing point decreases/increases as concentration increases/decreases As concentration increases freezing point gets colder  **1**  | **Not acceptable:**Wrong cause & effect eg: As freezing point decreases concentration increases.  |
|  | (c) | -1.8 to -2.0 inclusive  **1** | **Not acceptable:**Statement Less than -1.5  |

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| **4.**  | (a) |  **1**2·96/2·9605/2·961/2·9605263 on its own – 1 mark 3·0 or/3 with working  | 2·9 or 3·0 or 3 without working – zero marks |

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| **5.**  | (a) | B **1** |  |

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| **6.**  | (a) | (solution) C Last one/bottom one  **1** |  |
|  | (b) | any value above 4·4 and below 6·0 (not inclusive) must acknowledge both parameters number within range **1** | **Not acceptable:**value below 6·0 value above 4·4  |

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| **7.**  | (a) |  both required for **1** mark allow one missing H or one missing C to H bond  | **Not acceptable:**No 5 bonded carbons  |