Higher Chemistry 2005

Section A

1. Isotopes are elements with the same atomic number but a different mass number. The atomic number remains the same therefore the number of protons remains the same and the number of neutrons must change. Answer: **D**

2. Look to the solubility table in the data booklet and find the compound which is insoluble. In this case copper(ii) sulphate and sodium carbonate react together to form copper(ii)carbonate and sodium sulphate. As copper(ii) carbonate is insoluble the answer is **C**

3. Copper is an unreactive metal and is below hydrogen in the electrochemical series. Therefore only CO2 is produced. Answer: **A**

4. $Mg + 2HCl \rightarrow MgCl2 + H2$ $n=cv/1000 = (2x20)/1000 =0.04$ moles
   1mole Mg reacts with 2 moles HCl
   therefore 0.02 moles Mg will react with 0.04 moles of HCl Answer: **B**

5. Answer: **C** (Its just one of those things you have to know).

6. The activation energy for a reaction will always remain the same. A temperature decrease reduces the number of successful collisions. Answer: **D**

7. The enthalpy of combustion is the energy released when one mole of a substance burns completely in oxygen. When hydrocarbons combust they form CO2 and H2O therefore the answer must be **A**.

8. In the breaking of a bond energy is taken in(i.e. +ve) and in the formation of a bond energy is released (i.e. -ve). Therefore 432+149-(2x295) = -9 Answer **B**

9. The first ionisation energy is the energy required to remove one mole of electrons from one mole of gaseous atoms. Answer **C**

10. Look at the electronegativities in the data booklet to find answer **B**

11. Covalent compounds do not conduct so C and D are immediately ruled out. Ionic substances will conduct when aqueous or molten and have high mp and bp. Answer **A**

12. When crude oil is distilled the bonds between the molecules break as the compound is heated therefore it must be van der waal's bonding. As the compound returns to a liquid state these bonds reform. Answer **B**

13. Again this is just something you must know. Answer **D**

14. The density of the metal is greater than that of the original compound so it would be found on the bottom. As the chloride is molten we know the temperature must be greater than 328 celcius. Answer **D**

15. 38g of F2 = 6x10^23 molecules
100g of F2 = 1.58x10^24 molecules

28g of N2 = 6x10^23 molecules
100g of N2 = 2.14x10^24

32g O2 = 6x10^23 molecules
100g =1.875x10^ 24 molecules

2g of H2 = 6x10^23 molecules
100g = 3x10^25

Answer: **A**

16. 23 litres = 2x6x10^23 atoms
11.5 litres = 6x10^23 atoms

Answer **C**

17. $3CuO + 2NH_3 \rightarrow 3Cu + N_2 + 3H_2O$

2 vol 1 vol
100ml 50ml

Answer **A**

18. The shape of the molecule has been changed without loss of any atom therefore it is an example of reforming. Answer **D**

19. Methane Answer: **C**

20. Draw out each molecule to find Answer: **B**

21. The carboxyl COOH and the ester group COO are present. Answer: **B**

22. Draw out each molecule. Answer:**C**

23. If you draw out the oxidised molecule it can be seen 2 hydrogen atoms are removed and therefore 2g per mole are lost. Answer: **A**

24. Answer: **D**

25. CO and H2 Answer: **C**

26. H from the NH2 and Cl are lost. Answer: **A**

27. Answer: **C**

28. When a protein is denatured its shape changes. Answer: **A**

29. The graph shows an optimum temperature so an enzyme must be involved in the reaction. Answer: **A**

30. The price of raw materials can vary. Answer: **D**

31. The other 3 are continuous processes. Answer: **B**

32. Y→Z would be -74 therefore Z→Y must be +74. Answer: **A**

33. Rate of forward reaction = rate of reverse reaction. Answer: **C**

34. The addition of sodium hydroxide adds Na+ and OH-. The OH- will neutralise the H+ ions and therefore the equilibrium moves to the right to overcome the change. Answer: **D**

35. The concentration is decreased to make the pH less acidic. The pH=-log[H+] and as H+ is put into the formula in the format 10^n therefore the concentration of H+ will be decreased effectively by a factor of 100. Answer: **D**

36. [H+][OH-]=10^-14 pH = - log[H+] Answer: **C**
[H+][10^-1]=10^-14 pH = -log[10^-13]
[H+] = 10^-13 pH = 13

37. Potassium carbonate is the salt of a strong base and a weak alkali therefore gives an alkaline solution. Metal carbonates give of CO2 when reacted wit acid. Therefore Answer: **B**

38. Zn loses electrons and HCl is reduced. Answer: **A**

39. $^{32}_{15}P \rightarrow {}^{31}_{15}P + {}^{1}_{0}n$ Answer: **B**

40. At the beginning the radioisotope with mass number 200 would have 100% the isotope with 196 would have 0%. After on half life they would each have 50%. After 2 half lives 196 = 75% and 200 = 25%
2 half lives = 8 days Answer: **B**
half life = 4 days