

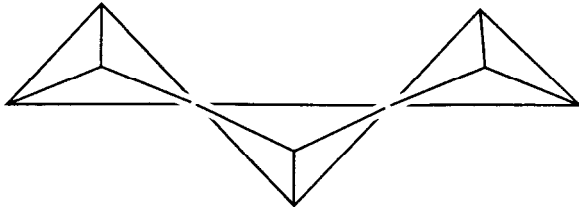

2815/03 June 02 Post coord Markscheme

1. (a) (i) Standard values are 298K and 100kPa (1 atm) (1).
Both temp and pressure are lower than these (1)/
 both vary with height (1) . AW 2
 Or temperature lower than 298K(l)
 Pressure less than 1 atm (1)
- (ii) 8 1
- (b) (i) ultraviolet light/sunlight 1
- (ii) steps 2 and 3 (1)
 the Cl atom/radical used in 2 is regenerated in 3. AW (1) 2
- (iii)
$$\begin{array}{ccccc} & ** & & ** & & ** \\ * & \text{Cl} & * & \text{O} & * & \text{O} & * \\ * & & * & & * & & * \\ & ** & & ** & & ** & \end{array}$$
 Accept dots and crosses or just dots. 1
- (c) (i) It absorbs harmful UV radiation (from the sun)/ high energy radiation (1). 1
- (ii) It causes photochemical smog/reacts with unburnt hydrocarbons / toxic/
 cracks rubber/causes leaf lesions etc (must be specific) .AW 1
- (iii) High residence time (60 years in troposphere) (1)
 caused by lack of reactivity (1)/ slow diffusion (1) 2
- (iv) Presence of C-H bond (1) allows degradation/breakdown in
 troposphere (1)/ before reaching stratosphere(1)/more reactive (1)/
 do not cause ozone breakdown (1) 2
- Question total**13
2. (a) Without oxygen 1
- (b) hydrogen sulphide: toxic/very smelly (1)
 methane: greenhouse gas/fire risk (1) 2
- (c) Two advantages: saves landfill (1);reduces bulk(1); energy retrieval (1);
 disposes of non-biodegradable plastics (1).AW. Any two.
 Two disadvantages. waste of fossil resources(1);
 precludes recycling of paper/plastic (1);
 polluting gas with effect (two allowed at 1 each)
 or other sensible ideas.AW. Any two.
 Give 1 mark for spelling, punctuation and grammar unless there are
 four or more mistakes 5

Question total 8

- 3 (a) equation (1) and state symbols (1)
- $$\text{MgCO}_3(\text{s}) + \text{H}_2\text{O}(\text{l}) + \text{CO}_2(\text{l}) = \text{Mg}(\text{HCO}_3)_2(\text{aq})$$
- Accept $\text{H}_2\text{CO}_3(\text{aq})$ on left. 2
 Allow (1) for $\text{HCO}_3^-(\text{aq})$ on right unless accompanied by CO_2 .
- (b) (i) molar mass of $\text{HCO}_3 = 61$ (1)
 concentration = $0.179/61 = 2.93 \times 10^{-3} \text{ mol dm}^{-3}$ (1) ecf
 - answer must have two or more SF. Bare answer scores (2)
- (ii) calcium (and magnesium) hydrogen carbonates decompose on heating (to produce gases)(1)
 Carbon dioxide gas is released (1)
- or $\text{Ca}(\text{HCO}_3)_2 = \text{CaCO}_3 + \text{CO}_2(\text{g}) + \text{H}_2\text{O}$ (1) 2
 Accept a vertical arrow for (g) ↑
- (c)(i) to kill bacteria /sterilisation 1
- (ii) to flocculate/precipitate fine suspended solids/colloids. AW 1

Question total 8

- 4 (a)(i) The one in the middle (ii) Accept any corner to corner version in a chain 1
- 
- (ii) Octahedral (1) 1
- 
- or recognisable (1) 2
- (b)(i) { tetrahedral/SiO₄ sheet
octahedral/ AlO₆ sheet
tetrahedral/SiO₄ sheet Ignore width of sheets
The words tetrahedral and octahedral not needed 1
- (ii) Find 4 points from: dry 2:1 clays are not hydrogen bonded between layers(1); water in wet 2:1 clays is loosely held between layers(1) by hydrogen bonding(1) (the clay swells). Drying removes this with contraction etc (1). 1:1 clays do not have this space between layers (1)/are hydrogen bonded between layers (1) AW 4
They must use the terms sheets and layers accurately.
- (c) They leave the crystal lattice/regular solid arrangement (1)/ionic bonds are broken(1) and become hydrated (1) (in solution). 2
- (d) (i) 55 protons (1) 82 neutrons(1) (ignore electrons). 2
- (ii) Most clays have negative charge on their surface (1) due to substitution of Si(IV) by Al(III)/ Al(III) by Mg(II) (1). This allows cation exchange/ binding of Cs⁺ (1). 3

Question total 16

PAPER TOTAL 15