A

## Answers to The Atmosphere End of Unit Test

Q	Answer with marks	Marking suggestions
1(a)	It is a gas at room temperature (1)	
1(b)	It is more expensive (1)	
1 (c) (i)	·Ö. ↓ H	
	(1) for bond with H	
	(1) for lone pairs	
	(1) for unpaired electron, hence a radical	
1(c) (ii)	$CF_{3}CCI_{2}(1)$	
1(c) (iii)	A radical reacts/is on the left (1);	
	a radical is formed/is on the right (1)	
1(d)	CFCs are photolysed (or words to that effect) (1)	Or equations for catalytic cycle –
	forming chlorine atoms (1)	can allow (1) for each correct
	these catalyse breakdown of ozone (1)	equation
	which screens/blocks/absorbs/reacts with high energy radiation/	
	ultraviolet (1) which is damaging to humans/ causes skin cancer (1)	
1(e) (i)	463 × 1000/6.02 × 10 <sup>23</sup> (1)	
	$= 7.69 \times 10^{-19}$ J (1) (includes unit and 3/4 sf)	
1(e) (ii)	7.69 x 10 <sup>-19</sup> /6.63 x 10 <sup>-34</sup> (1)	
	$= 1.16 \times 10^{15}$ Hz (1) for number; (1) for units and 3/4sf.	
1(e) (iii)	This is a high frequency (1); which is not present in tropospheric sunlight (1)	

Q	Answer with marks	Marking suggestions
2(a)	Solar radiation also contains ultraviolet (1) and infrared (1)	
2(b) (i)	Their bonds (1) start to vibrate (1)	
2(b) (ii)	Water vapour/methane/dinitrogen oxide/CFC-11/CFC-12 (1)	
2(c) (i)	Burning (1); of fuels (1) or Decreased (1); photosynthesis (1)	Not just 'chopping down rain forests'
2(c) (ii)	More $CO_2$ means more infrared absorbed (1) which leads to more molecular kinetic energy (1)	
2(d) (i)	Both forward and back reactions constantly occurring (1); at equal rates (1); concentrations of reactants and products remain constant (1)	Second point includes first
2(d) (ii)	Statement of Le Chatelier (1); more $CO_2(g)$ moves equilibrium to right (1); resulting in more $CO_2(aq)$ (1)	
2(d) (iii)	One of (1): burning less fuel cutting down fewer trees attempting to dissolve more CO <sub>2</sub> in water	

A

Q	Answer with marks	Marking suggestions
3(a)	2-bromo-2-chloro-1,1,1-trifluoroethane/1-bromo-I-chloro- 2,2,2-trifluoroethane (2)	Allow (1) if halogens not listed alphabetically, but otherwise correct
3(b)	Distillation (1)	
3(c) (i)	More molecules (1) have energy greater than the activation energy (1); which is the energy molecules need to react (1) when they collide (1)	
3(c) (ii)	C–Br has a lower bond enthalpy (1); than either C–F or C–Cl (1)	
3(c) (iii)	F O—H     F—C—C—CI 1     F H	Formulae do not have to be full structural, just need to show the structure; the product drawn is not a stable molecule but students will not know this
	<ol> <li>Br replaced by OH</li> <li>rest of molecule unchanged</li> </ol>	
3(d) (i)	A species with a lone pair (1); which forms a covalent bond (1); with a positively charged carbon atom (1)	
3(d) (ii)	Carbon has a lower electronegativity than Cl or Br (1) thus the C–Cl and the C–Br bonds are polarised (1) which results in a positive charge on the carbon (1)	
3(e) (i)	More collisions per unit time (1); resulting in faster reaction (1)	
3(e) (ii)	Catalysed reaction Catalysed reaction Reactant Intermediate compound Products	
	► Progress of reaction	
	<ol> <li>(1) for uncatalysed route and start and finish levels</li> <li>(1) for catalysed route with lower activation enthalpy</li> <li>(1) for drawing double-humped curve for the catalysed reaction</li> <li>(1) for labelling intermediate compound</li> <li>(1) for labelling activation enthalpy of one route</li> </ol>	