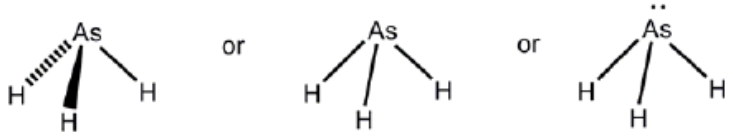
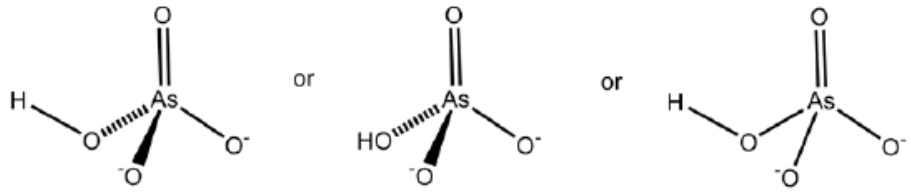
Question 5			
		Answer	**Marks**
(a)	**i)**	It must be clear from the structure that arsine is not planar. Structures similar to those shown below would be acceptable:  	1
	ii)	$4AsH_3 + 3O_2 \rightarrow 4As + 6H_2O$	1
(b)	**i)**	As_2O_3	1
	ii)	$As_2O_3 + 6Zn + 6H_2SO_4 \rightarrow 2AsH_3 + 6ZnSO_4 + 3H_2O$	1
(c)	**i)**	+5 or (V)	1

	ii)	Both the bonding and geometry must be clear, structures such as those shown below would be acceptable:  	1
(d)	**i)**	From the graph the $t_{1/2}$ is 8 mins $k = \ln 2 / t_{1/2}$ therefore $k = 0.087$ min^{-1} (0.0014 s^{-1} or 0.144×10^{-3} s^{-1}) Accept values for $t_{1/2}$ in the region of 7 to 9 mins ($k = 0.08$ to 0.1 min^{-1}) also accept correct values for k given in s^{-1}.	1
	ii)	$[HAsO_4^{2-}{}_{(aq)}]_t = [HAsO_4^{2-}{}_{(aq)}]_0 \exp^{-(kt)}$ $10 = [HAsO_4^{2-}{}_{(aq)}]_0 \exp^{-(0.09*55)}$ $[HAsO_4^{2-}{}_{(aq)}]_0 = 1400$ µg dm^{-3} For $k = 0.08$ min^{-1}, $[HAsO_4^{2-}{}_{(aq)}]_0 = 800$ µg dm^{-3} whilst for $k = 0.1$ min^{-1}, $[HAsO_4^{2-}{}_{(aq)}]_0 = 2400$ µg dm^{-3}. Full marks should be given for values within this range.	2
(e)		$[HAsO_4^{2-}{}_{(aq)}]_{t=0} = [HAsO_4^{2-}{}_{(aq)}]_{eq} + [HAsO_4^{2-}{}_{(adsorbed)}]_{eq}$ Therefore: $K = \dfrac{[HAsO_{4(aq)}^{2-}]_{t=0} - [HAsO_{4(aq)}^{2-}]_{eq}}{[HAsO_{4(aq)}^{2-}]_{eq}}$ Rearranges to give: $[HAsO_{4(aq)}^{2-}]_{eq} = \dfrac{[HAsO_{4(aq)}^{2-}]_{t=0}}{1+K} = \dfrac{30}{1+186} = 0.16 \mu g/dm^3$	2