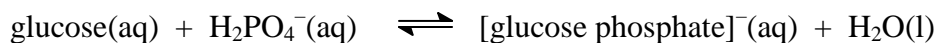
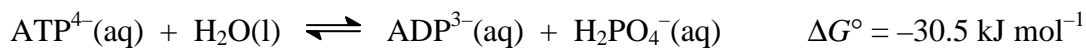


**Marks**  
**6**

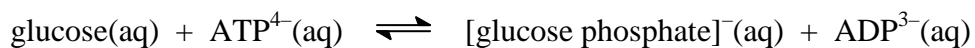
- The first step in the metabolism of glucose in biological systems is the addition of a phosphate group in a dehydration-condensation reaction:



The free energy change associated with this reaction is  $\Delta G^\circ = 13.8 \text{ kJ mol}^{-1}$ . The reaction is driven forwards by harnessing the free energy associated with the hydrolysis of adenosine triphosphate,  $\text{ATP}^{4-}$ , to adenosine diphosphate,  $\text{ADP}^{3-}$ :



The overall reaction is thus:



Calculate the equilibrium constant associated with this overall reaction at body temperature (37 °C).

Answer:

This overall equilibrium reaction is investigated by adding 0.0100 mol of  $\text{ATP}^{4-}$  to a flask containing 175 mL of a 0.0500 M aqueous solution of glucose at 37 °C. What percentage of the  $\text{ATP}^{4-}$  will have been consumed when the system reaches equilibrium?

Answer:

Suggest two simple ways of further reducing the remaining percentage of  $\text{ATP}^{4-}$ .