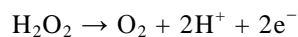


## Example questions

1. Hydrogen peroxide is used in gels to whiten teeth. The ion–electron equation for the oxidation of hydrogen peroxide is:



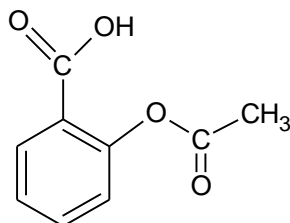
**Using your knowledge of chemistry, comment on possible methods for measuring and comparing the concentration of hydrogen peroxide present in two different gels.**

2. A student makes the following statement:

*'Sugar can be used to produce alcohol, a carboxylic acid and the ester ethyl ethanoate'*

**Using your knowledge of chemistry, comment on the accuracy of the student's statement.**

3. Aspirin is a widely used medicine. It is advised that it is stored in dry, cool conditions.

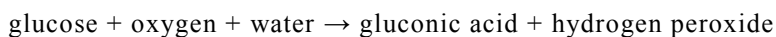


Using your knowledge of chemistry, comment on the reasons why aspirin should be stored under these conditions.

4. The Periodic Table groups together elements with similar properties. In most Periodic Tables hydrogen is placed at the top of Group 1, but in some it is placed at the top of Group 7.

**Using your knowledge of chemistry, comment on the reasons for hydrogen being placed above either Group 1 or Group 7.**

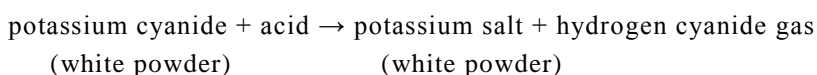
5. Oxygen gas speeds up the rate at which food is spoiled. To improve the shelf-life of foods, food manufacturers use several methods to remove oxygen from inside the food packaging. In one method, an enzyme is added that catalyses a reaction between oxygen and the glucose which is often present in foods.



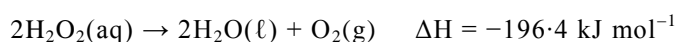
**Using your knowledge of chemistry, comment on why this method may not be suitable to improve the shelf-life of all foods.**

6. Rasputin, often referred to as the 'mad monk', was a very powerful figure in the life of Alexandra, the last Tsarina of Russia. His enemies decided to kill him using a cyanide compound. Cyanide compounds are deadly poisons. Using a bottle of potassium cyanide, they attempted to poison a cake and some wine. Rasputin ate the cake and drank the wine and yet was not harmed. Although his followers claimed this was a sign of Rasputin's supernatural powers, there are chemical explanations.

**Using your knowledge of chemistry and the following information, comment on possible chemical reasons as to why the cake and wine did not poison Rasputin.**



7. Concentrated solutions of hydrogen peroxide are used in the propulsion systems of torpedoes. Hydrogen peroxide decomposes naturally to form water and oxygen:



Transition metal oxides act as catalysts in the decomposition of the hydrogen peroxide.

Unfortunately, there are hazards associated with the use of hydrogen peroxide as a fuel in torpedoes. It is possible that a leak of hydrogen peroxide solution from a rusty torpedo may trigger an explosion.

**Using your knowledge of chemistry, comment on why this could happen.**

8. An internet discussion board called 'Bad Chemistry on TV', has an entry referring to an episode of the television drama *CSI: Miami*.

*'The episode of CSI: Miami last night had the deceased victim floating in a swimming pool contaminated with sodium hydroxide. The concentration was high enough to eat through glass. When the CSI guys realised it was an alkali, they knew they needed to neutralise it in order to retrieve the body. So they sent one of the team to the local grocery store for vinegar. They proceeded to pour the vinegar from four litre jugs into the pool, dropping the pH from almost 13 to exactly 7.0 – all within a few seconds, and without any stirring!'*

The volume of the swimming pool is 100,000 litres.

Vinegar is approximately a 1.0 mol l<sup>-1</sup> solution of ethanoic acid.

**Using your knowledge of chemistry, comment on whether or not the events described in the episode of *CSI: Miami* could take place.**