Lending a hand with sanitiser – answers

Education in Chemistry
September 2020
rsc.li/2XNzONL

Reading comprehension questions and basic mathematical skills applied to chemical formulations.

1. Line 6
   While soap and water are the materials of choice for hand washing, an alcohol-based hand sanitiser is a great alternative when bathroom facilities aren't available.

   Line 8
   And when everyone wants a bottle for their handbag or coat pocket, demand is bound to outstrip supply.

   Line 11
   Once the RNA is exposed, it's quickly broken down and the virus is rendered inert.

   Line 22
   One such organisation was Bristol University's School of chemistry, where one professor, Tim Gallagher, turned his attention away from synthetic organic chemistry to spearhead a programme of hand sanitiser manufacture.

   Line 36
   IPA, on the other hand, is not used for drinks (in fact, it's toxic), but hand sanitisers made using this recipe are classed officially as biocides and as such need to be given the green light by another organization – the UK Health and Safety Executive (HSE).

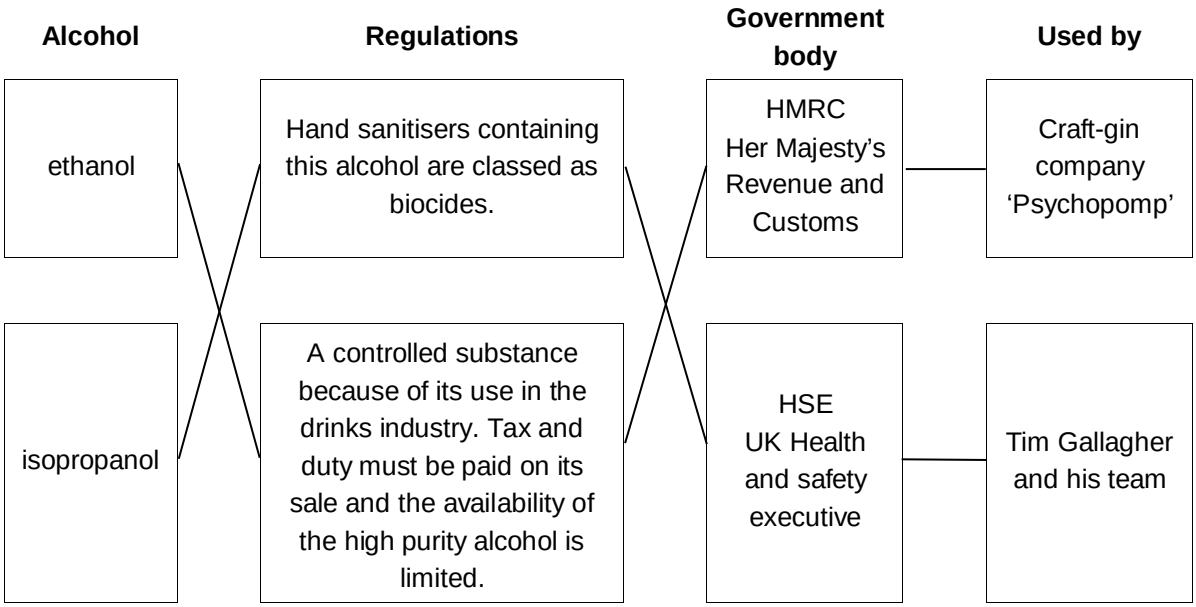
   Line 71
   Bristol-based Psychopomp usually specialises in limited-edition gin, but they soon saw that their talents could be put to other uses when news of the coronavirus broke.

   Line 96
   Now that gap is closing, they can think about going back to their day jobs, but with more sectors of the economy opening up after lockdown (and the threat from other diseases such as influenza being an ever-present danger) the ability of small groups of people to adapt and think on their feet in this way is – quite literally – a life saver.

2. a. A mixture consists of two or more elements or compounds not chemically combined together.

   b. Other ingredients include:
   - hydrogen peroxide
   - glycerol
   - water

c.



3. a. $\frac{75}{100}$ × 10 L = 7.5 L

b. i. $\frac{60}{100}$ × 10 L = 6 L

ii. Volume of isopropanol saved = 7.5 L – 6 L = 1.5 L

Cost = $\frac{£76.10}{2\ L}$ × 1.5 L = £57.08

Challenge

To make up 10 L of hand sanitiser containing 75% isopropanol, 7.5 L of isopropanol is required.

7.5 L of commercially available isopropanol contains only 99.8% isopropanol.

The volume of impure isopropanol needed to contain 7.5 L is therefore:

$\frac{7.5\ L}{99.8}$ × 100 = 7.515 L or 7515 cm^3.