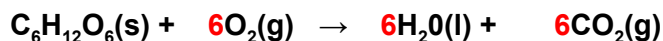


Harry Potter and the Chemistry Review Questions

1. Professor Snape has assigned everyone to make a potion that alleviates pain, it can be modelled by the equation: $C_7H_6O_3 + C_4H_6O_3 \rightarrow C_9H_8O_4 + CH_3COOH$. Harry Potter thinks he's doing very well and followed all the steps correctly, however nothing seems to be happening in his cauldron! List a minimum of three things that should be occurring in Harry's cauldron to indicate a possible chemical change.

Bubbling, temperature change, odour, colour change.

2. It's dinner time at Hogwarts, and Crabbe and Goyle are stuffing themselves full of food, like always. For dessert, they eat tons of carbohydrates, which can be modelled by the following equation:

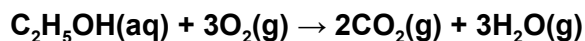


Balance the above equation.

3. In Harry Potter and the Prisoner of Azkaban, Harry Potter was attacked by a Dementor, causing him to faint on the train to Hogwarts. Luckily, Professor Lupin was there to get rid of the dementor, however not before Harry passed out. In order to boost Harry's energy back, Lupin then gave Harry some chocolate, which contained 600.0 g of sugar or sucrose ($C_{12}H_{22}O_{11}$). Determine the number of moles Harry was given.

1.75 moles

4. A new racing broom has just been created, and it's the fastest one yet! The ZoomBroom 5000 combines both magic, and muggle technology to get the broom flying and speeding through the skies. The broom works on ethanol, and can be modelled by the equation:



What mass of ethanol would be required to react with 500 g of oxygen in order to get the broom running?

240 g

5. After getting in a serious accident involving the whomping willow, Ron must be given a laughing gas, or N_2O as Madame Pomfrey does her work to heal him. Draco however, is working for Madame Pomfrey as a punishment, and gives Ron a compound consisting of 30.446% nitrogen and 69.554% oxygen. Is this the correct compound?

No, this compound is NO_2

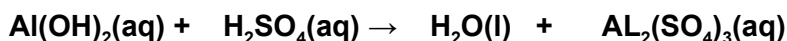
6. Professor Sprout needs to plant Mandrakes out in the greenhouse after the chamber of secrets is opened once again. Unfortunately, the greenhouse soil has become quite acidic, therefore making it much harder to grow the plants, so Professor Sprout decides to add CaCO_3 (limestone) to the HCl rich soil in order to neutralize it. This can be represented by the equation:



Calculate the mass of CaCO_3 required to neutralize 20.00 mL of 0.200 M of HCl .

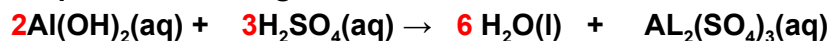
0.200 g

7. Professor Snape tells Ron, one of the worst students in his class to perform the reaction modelled by the following equation:



Write the:

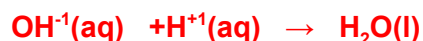
a) Balanced equation including states:



b) Total dissociated ionic equation:



c) Net ionic equation:



8. The Famous Black Lake outside of Hogwarts where mermaids and a giant squid, among other creatures resides has a pH of 3.95. Calculate the hydrogen ion concentration of the lake.

$1.12 \times 10^{-4} \text{ mol/L}^{-1}$

9. Determine the pOH of Black Lake.

10.05

10. Fred and George are planning another elaborate prank, and this time decide to set off an explosion using 4.36 moles of compressed chlorine gas in the middle of the night to wake up all the professors. To get it to Hogwarts, the fluorine gas must be kept safely in containers of 40.0 L capacity at a temperature of 25.6 degrees celsius. What is the pressure of the container?

271 kPA