

Wine goes bad soon after opening because the ethanol



in it reacts with oxygen gas



from the air to form water



and acetic acid



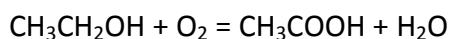
, the main ingredient of vinegar.

What mass of acetic acid is produced by the reaction of

7.43g

of oxygen gas?

### Solution



1. Find chemical amount of oxygen:

$$n = m/M;$$

$$M(\text{O}_2) = 16 \cdot 2 = 32 \text{ (g/mol)};$$

$$n(\text{O}_2) = 7.43/32 = 0.23 \text{ (mole)}.$$

2. Find chemical amount of acetic acid:

according to equation 1 mole of oxygen gives 1 mole of acetic acid,

$$\text{i.e. } n(\text{CH}_3\text{COOH}) = n(\text{O}_2);$$

$$n(\text{CH}_3\text{COOH}) = 0.23 \text{ mole}.$$

3. Find mass of acetic acid:

$$m = M \cdot n;$$

$$M(\text{CH}_3\text{COOH}) = 12 \cdot 2 + 1 \cdot 4 + 16 \cdot 2 = 60 \text{ (g/mol)};$$

$$m(\text{CH}_3\text{COOH}) = 60 \cdot 0.23 = 13.80 \text{ (g)}.$$

**Answer:** 13.80 g