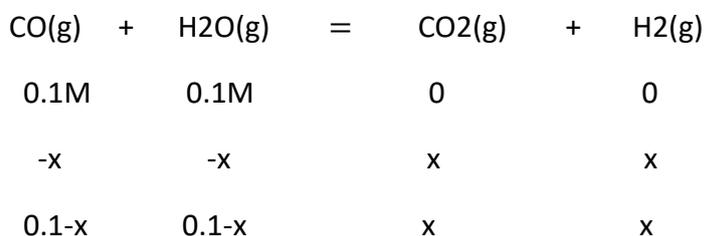


## Answer on Question #83619 - Chemistry - Physical Chemistry

Question:

The value of  $K_c$  is 4.24 at 800 Kelvin temperature for the reaction  $\text{CO(g)} + \text{H}_2\text{(g)} \rightleftharpoons \text{CO}_2\text{(g)} + \text{H}_2\text{(g)}$ . If initial concentration is 0.10 M. Find the concentration of each components.

**Solution:**



$$K_c = \frac{x^2}{(0.1-x)^2};$$

$$4.24 = \frac{x^2}{(0.1-x)^2};$$

$$x^2 = 4.24(0.01 + x^2 - 0.2x);$$

$$x^2 = 0.0424 + 4.24x^2 - 0.848x;$$

$$3.24x^2 - 0.848x + 0.0424 = 0;$$

$$x_1 = 0.067 \quad x_2 = 0.194;$$

$$x_2 = 0.194 - \text{no!}$$

$$\text{So, } [\text{CO}_2] = [\text{H}_2] = x_1 = 0.067 \text{ M};$$

$$[\text{CO}_2] = [\text{H}_2] = x = 0.067 \text{ M};$$

$$[\text{CO}] = [\text{H}_2\text{O}] = 0.1 - x = 0.1 - 0.067 = 0.033 \text{ M}.$$

**Answer:**  $[\text{CO}_2] = [\text{H}_2] = 0.067 \text{ M}$  and  $[\text{CO}] = [\text{H}_2\text{O}] = 0.033 \text{ M}$ .

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