

Problem 1.

Estimate how close an H_3O^+ ion and a hydrated electron must be to interact

Solution

$$\begin{aligned}R_e &= 2.1 \text{ \AA} \\R_{\text{H}_3\text{O}^+} &= 0.3 \text{ \AA} \\R_{rxn} &= R_e + R_{\text{H}_3\text{O}^+} \\&= 2.4 \text{ \AA}\end{aligned}$$

Problem 2.

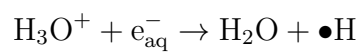
A 50 cm^3 sample of water is given a dose of 50 mGy from 10 keV electrons. If the yield of H_2O_2 is $G = 1.81$ per 100 eV , how many molecules of H_2O_2 are produced in the sample?

Solution

$$\begin{aligned} \frac{50 \text{ J}}{1 \times 10^3 \text{ kg}} \times 50 \text{ cm}^3 \times \frac{1 \text{ g H}_2\text{O}}{1 \text{ cm}^3 \text{ H}_2\text{O}} \times \frac{1 \text{ kg}}{1 \times 10^3 \text{ g}} \times \frac{1 \text{ eV}}{1.6 \times 10^{-19} \text{ J}} \\ = 2.82 \times 10^{14} \end{aligned}$$

Problem 3.

During the chemical stage of radiolysis of water, what is the only chemical reaction to add reactivity to the system?

Solution

Problem 4.

During what phase of the cell cycle is the genetic material replicated?

Solution

Interphase