Problem 1.

Procedure necessary to grow cell culture in a Petri dish.

Solution

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

Problem 2.

Definition of cell survival, i.e. how will you determine if a particular cell survives the radiation dose to which it is exposed?

Solution

Problem 3.

Procedure for accounting for cell death due to experiment conditions, i.e. how would you control for cell death not attributed to radiation exposure but rather experiment conditions.

Solution

Problem 4.

Suppose your experiment budget allows for the measurement of only five Petri dish cultures. Using the D0 doses for cell lines we have discussed in class as a guide, what five radiation doses would you select to produce your curve. Please give a short justification for this decision.

Solution

Problem 5.

Procedure for determining how many cells to seed in each Petri dish.

Solution

Problem 6.

Method for determining how many cells in each Petri dish survive radiation dose.

Solution

Problem 7.

Hypothesis the shape of your measured survival curve if the cell line was a human sperm cell (i.e. shoulder or no shoulder). What values would you hypothesis for the value of D0 and n the extrapolation number the human sperm cell line?

Solution

Problem 8.

Hypothesis the shapes of your measured survival curve if the cell line was a human melanoma (i.e. shoulder or no shoulder). What values would you hypothesis for the value of D0 and n the extrapolation number the melanoma cell line?

Solution

Problem 9.

Procedure for accounting for cell cycle effects. As we discussed in class the cell cycle can greatly affect cell radiosensitivity. Describe a method for synchronizing the phase of cycle for cells in culture.

Solution