

## QUESTION

1. A company is considering a new investment project. The project has a life of 5 years and requires an initial investment of \$100,000. The project is expected to generate cash flows of \$25,000 per year for the first 3 years and \$30,000 per year for the last 2 years. The company's cost of capital is 10%.

2. The company is also considering a second investment project. This project has a life of 4 years and requires an initial investment of \$80,000. It is expected to generate cash flows of \$20,000 per year for the first 2 years and \$25,000 per year for the last 2 years. The company's cost of capital is 10%.

3. The company is also considering a third investment project. This project has a life of 3 years and requires an initial investment of \$60,000. It is expected to generate cash flows of \$15,000 per year for the first year and \$20,000 per year for the next 2 years. The company's cost of capital is 10%.

4. The company is also considering a fourth investment project. This project has a life of 2 years and requires an initial investment of \$40,000. It is expected to generate cash flows of \$10,000 per year for the first year and \$15,000 per year for the second year. The company's cost of capital is 10%.

5. The company is also considering a fifth investment project. This project has a life of 1 year and requires an initial investment of \$20,000. It is expected to generate a cash flow of \$25,000 at the end of the year. The company's cost of capital is 10%.

6. The company is also considering a sixth investment project. This project has a life of 1 year and requires an initial investment of \$10,000. It is expected to generate a cash flow of \$15,000 at the end of the year. The company's cost of capital is 10%.

7. The company is also considering a seventh investment project. This project has a life of 1 year and requires an initial investment of \$5,000. It is expected to generate a cash flow of \$10,000 at the end of the year. The company's cost of capital is 10%.

8. The company is also considering an eighth investment project. This project has a life of 1 year and requires an initial investment of \$2,000. It is expected to generate a cash flow of \$5,000 at the end of the year. The company's cost of capital is 10%.

9. The company is also considering a ninth investment project. This project has a life of 1 year and requires an initial investment of \$1,000. It is expected to generate a cash flow of \$2,000 at the end of the year. The company's cost of capital is 10%.

10. The company is also considering a tenth investment project. This project has a life of 1 year and requires an initial investment of \$500. It is expected to generate a cash flow of \$1,000 at the end of the year. The company's cost of capital is 10%.

## ANSWER

1. The NPV of the first investment project is \$10,000.

2. The NPV of the second investment project is \$15,000.

3. The NPV of the third investment project is \$10,000.

4. The NPV of the fourth investment project is \$5,000.

5. The NPV of the fifth investment project is \$15,000.

6. The NPV of the sixth investment project is \$10,000.

7. The NPV of the seventh investment project is \$5,000.

8. The NPV of the eighth investment project is \$3,000.

9. The NPV of the ninth investment project is \$1,000.

10. The NPV of the tenth investment project is \$500.

## CHAPTER 11 POLYMERIZATION

The process of polymerization involves the joining of small molecules (monomers) into long chains (polymers). This process is fundamental in the synthesis of plastics, fibers, and other materials. The rate of polymerization is influenced by various factors, including temperature, concentration of monomers, and the presence of catalysts. The study of polymerization kinetics is essential for understanding and controlling the properties of the resulting polymers.

One of the primary methods for studying polymerization is through the measurement of the rate of monomer consumption. This is often done using techniques such as titration, gravimetry, or spectroscopy. The resulting data is used to determine the order of the reaction and the rate constant, which provides insight into the mechanism of the polymerization process.

In addition to kinetic studies, the characterization of the resulting polymers is also a crucial part of polymerization research. This involves determining the molecular weight, molecular weight distribution, and other properties of the polymer chains. Techniques such as gel permeation chromatography (GPC) and size exclusion chromatography (SEC) are commonly used for this purpose.

The study of polymerization is a rapidly evolving field, with new materials and techniques being developed all the time. As our understanding of the fundamental principles of polymerization continues to grow, we can expect to see even more advanced and functional materials in the future.

## EXERCISES

1. A reaction is first order in A and second order in B. Write the rate law for the reaction.
2. The half-life of a first-order reaction is 10 minutes. Calculate the rate constant for this reaction.
3. A reaction is second order in A. The initial concentration of A is 0.1 M and the half-life is 100 minutes. Calculate the rate constant for this reaction.
4. A reaction is zero order in A. The initial concentration of A is 0.1 M and the half-life is 100 minutes. Calculate the rate constant for this reaction.

## PROBLEMS

1. A reaction is first order in A and second order in B. The initial concentration of A is 0.1 M and the initial concentration of B is 0.2 M. The half-life of the reaction is 100 minutes. Calculate the rate constant for this reaction.
2. A reaction is second order in A. The initial concentration of A is 0.1 M and the half-life is 100 minutes. Calculate the rate constant for this reaction.
3. A reaction is zero order in A. The initial concentration of A is 0.1 M and the half-life is 100 minutes. Calculate the rate constant for this reaction.
4. A reaction is first order in A and second order in B. The initial concentration of A is 0.1 M and the initial concentration of B is 0.2 M. The half-life of the reaction is 100 minutes. Calculate the rate constant for this reaction.

## REFERENCES

1. Smith, J. D. *Chemical Kinetics*. Wiley, 1980.
2. Jones, A. B. *Reaction Kinetics*. McGraw-Hill, 1975.
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