Free radical substitution

Radical substitution or free radical substitution is a type of reaction mechanism.

Reaction mechanism: Shows the are into products.

Radical substitution reactions involving alkanes:

Reagents:

Conditions:

Key terms involved in this reaction mechanism:

Overall equation: The reaction of an equation showing and and the amounts needed (stoichiometry).

Initiation:

1st stage in which two are formed through fission.

Propagation:

2nd stage whereby a reacts with a molecule to form another and a molecule.

Termination: 3rd stage where two react to form a molecule. This is the end of the reaction.

Free radical: An or a with an
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Homolytic fission: The breaking of a bond to form ,
by each from the covalent bond being given to each in the covalent bond.

Heterolytic fission: The breaking of a bond to form a (positive ion) and an (negative ion). A of electrons in the covalent bond is given to atom in the covalent bond.

An example of a radical substitution mechanism:

Chlorine can react with methane to produce chloroethane via a free radical substitution reaction.

Write an **overall equation** for the reaction:

Write a radical substitution mechanism for the above reaction including names of each step key words and an equation for these steps.

Initiation:

Propagation:

Termination:

What organic products are produced in the termination steps?

Look more closely at the propagation step. Do you think that these are the only products that could be obtained?

Why might this be an inefficient way to synthesise chloromethane?

The products in the termination step shown are they the only products that can form?

Answer the following question:

1) a) Pentane can react with bromine via a free radical substitution reaction:

Outline the mechanism for this reaction. Include all relevant key words and reagents in each step.

b) Write two further propagation reactions that could occur.

c) Show how a **branched** organic product could form.