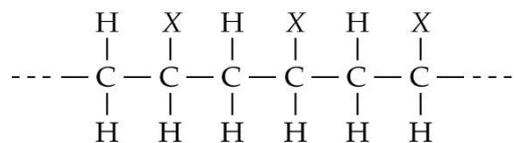


### Quiz (Addition Polymerisation)

A large cluster of rubbish is found in the ocean. Polymer A is found in the rubbish cluster. It has the following structure:



X is a group of atoms containing carbon and hydrogen only.

- (a) Name the type of polymerization involved in the production of A.
- (b) 10.0 g of the monomer of polymer A undergoes complete combustion to give 33.85 g of carbon dioxide and 6.93 g of water.
- (i) Determine the empirical formula of the monomer.  
(Relative atomic masses: H = 1.0, C = 12.0)
- (ii) The molecular mass of the monomer is found to be 104.0. Draw the structure of the monomer.

## Suggested Answer

(a) Addition polymerization

(b) (i) Mass of H in the monomer =  $6.93 \times [2.0 / (1.0 \times 2 + 16.0)] = 0.77 \text{ g}$

Mass of C in the monomer =  $33.85 \times [12.0 / (12.0 + 16.0 \times 2)] = 9.23 \text{ g}$

	C	H
Mass (g)	9.23	0.77
Number of moles of atoms (mol)	$9.23 / 12.0 = 0.77$	$0.77 / 1.0 = 0.77$
Mole ratio of atoms	1	1

$\therefore$  the empirical formula of the monomer is CH.

(ii) Let the molecular formula of the monomer be  $(\text{CH})_n$ .

$$n \times (12.0 + 1.0) = 104.0$$

$$n = 8$$

The molecular formula of the monomer is  $\text{C}_8\text{H}_8$ .

The identity of X is found by subtracting two carbon atoms and three hydrogen atoms from the molecular formula of the monomer. Thus, X is a phenyl group ( $\text{C}_6\text{H}_5$ ).

