CHAPTER I

INTRODUCTION

1.1 INSPIRATION

It is evident that the quantity of air-borne pollutants are continuously increasing in the air we breath. Consequently, demand for air purifiers and masks is increasing. Filter is one of the main components of an air purifier. Sponge is one of the main common types of filters.

Activated carbon is commonly used to remove toxic gas. There are two principle methods to utilize activated carbon : packing column of activated carbon particles and sponge incorporated with activated carbon. The latter is commonly used in masks, house-hold air purifiers and air conditioners.

Sponge most commonly used today are of the following types : cellulose, polyurethane and polyvinyl-formaldehyde or PVA. Table 1.1 presents a comparison of properties of various sponges. It reveals that PVA sponges are superior to others.

A good advantage of Polyvinyl - formal foams or PVA sponges is that they have a branched open celled structure, giving them a high efficiency as filters for air, water and oils, and allowing repeated use, with washing. The sponges, because of their excellent chemical resistance, can be used as filters for many materials. The affinity of the sponge for water gives it good elasticity and a tough skin when wet. PVA sponges last longer than viscose sponges, and any desired size and number of cells per unit volume can be produced.

Table 1.1 Comparison of Properties of Sponge[1]

	PVA SPONGE	CELLULOSE SPONGE	PU SPONGE
Durability	excellent	poor	poor
Water absorption	excellent	fair	poor
Chemical resistance	excellent	poor	fair
Water absorption speed	fast	less fast	slow
Abrasion resistance (time before breakage)	1000 - 2000	500 - 800	100 - 150
Environmentally friendly	biodegradable	biodegradable	Not biodegradable
Lint free/ leave fluff	lint free	leaves fluff	leaves fluff
Resistance to UV rays	no change under 1000 hrs	weakened under 200 hrs	weakened under 100 hrs
condition when burned	no noxious gas	no noxious gas	noxious gas at high temperature

The uses of polyvinyl alcohol sponge include intake filters for compressors, engines and air conditions, and filters for all kinds of industrial oils and chemicals, water and paints. Other uses are as domestic washing sponges and other absorbent cloths, industrial dehydration rollers, paint rollers and acoustic filters.

Various research work on synthesis of PVA sponges were published as mentioned in Chapter 2. However, published work on activated carbon-filled sponge has not been available. Thus it is beneficial that this work on synthesis of activated carbon-filled PVA sponge and its properties be carried out.

1.2 OBJECTIVE OF THIS WORK

Developing activated carbon-filled sponge that is fit for air purifying.

1.3 THE SCOPE OF THIS WORK

1.Synthesis of sponge

1.1 Determine optimum composition :

A. determine material used: type of polymer and reactant ratio

B. determine optimum process condition :

variables to be studied: reaction time

1.2 Characterization of sponge produced: pore size and pore distribution

2. Activated carbon-filled sponge:

determine optimum quantity of activated carbon required.

3.Testing of performance of activated carbon-filled sponge:

- resistance to air flow
- air pollutant adsorption ability