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Production of Local Balm Using Simple Substances in a Batch Reactor

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Abstract

Some definitions of balm were stated. Simple substances were used for the production of the balm. The substances used were Paraffin oil, Eucalyptus oil, Peppermint oil, Methisolate, Menthol crystal, Paraffin wax, Industrial Camphor, Petroleum Jelly, Heater (hot plate), Batch reactor or a Beaker, Spatula (stirrer) and a weighing balance. The

batch reactor was considered. The height of the batch reactor used in this study was about 30cm and the cylindrical radius was 10cm. The balm produced was smooth as a result of the constant stirring and the balm produced served its purpose.

Keywords: Production, Local, Balm, Substances, Batch, Reactor

1. Introduction

Balm is an aromatic or fragrant ointment or any of several aromatic plants of the mint family that heals, soothes, or mitigates pain. It is a balsamic resin especially, one from small tropical evergreen trees (genus *Commiphora* of the family *Burseraceae*). It can also be defined as an oily substance that has a pleasant smell and used for healing, smoothing or protecting the skin. In this paper a constant volume batch reactor is used for the production of a local balm using simple substances.

2. Materials and Method

2.1 Materials

Simple substances were used for the production of the local Balm (Yousuo, 2023; Amoo, 2013) ^[2, 3]. They were considered simple because they were not scarce and can be easily gotten from the open market. They include the following:

1. Paraffin oil
This is used for the treatment of skin. It is also used for the preparation of pomade cream.
2. Eucalyptus oil
It is an antimicrobial and also used in relieving cold.
3. Peppermint oil
It is added to balm because of their relief effect. It also relieves itching, acne, muscle pain, etc. The feeling of mint to the body when used gives an aura of expression.
4. Methisolate or Merthiolate
Merthiolate is a chemical that contains mercury substance which is used in killing germs and also used in preserving medicinal products. Large amounts of it may be harmful to the skin.
5. Menthol crystal: It cleanses the lung when inhaled thereby inhibiting throat infections. It also gives good sensation especially if the place you are is airy.
6. Paraffin wax
Paraffin wax is made from saturated hydrocarbons. It is used in salons for the treatment of the skin, hands and feet (Amoo, 2013) ^[3].
7. Industrial Camphor
It treats infection, relief pain and itching in the body when used in balm production. Impure camphor is sometimes dangerous to the health as it causes damage in the kidney when inhaled.
8. Petroleum Jelly
It is a body lubricant and a good body builder and also protects the skin.
9. Heater (hot plate)
This is used for heating the beaker.

10. Batch reactor or a Beaker
This serves as the reactor or a container.
11. Spatula (stirrer)
This was used to stir the mixture.
12. Weighing balance
This was used to obtain the quantity of the substances needed.

3. Method

The constant volume batch reactor can be designed and fabricated using the general mole balance for any type of reaction for species A is shown in equation (1). (Andrew, 2014; Gary and Arland, 2003)^[1, 4].

$$F_{AO} - F_A + G_A = \frac{dN_A}{dt} \quad (1)$$

Where

F_{AO} = the input molar flow rate

F_A = the output molar flow rate

G_A = the generation

$\frac{dN_A}{dt}$ = the accumulation (all units are moles/time)

If the system variables are uniform throughout the system volume, then

$$G_A = r_A V \quad (2)$$

Where

V = the system volume and

r_A = the rate of formation of species A

If r_A changes with position in the system volume, then

$$F_{AO} - F_A + \int r_A dv = \frac{dN_A}{dt} \quad (3)$$

For a batch reactor, there is no input or output when the reaction is occurring, that is

$$F_{AO} = F_A = 0 \quad (4)$$

This implies that

$$\frac{dN_A}{dt} = \int r_A dv \quad (5)$$

And so

$$\frac{dN_A}{dt} = r_A V \quad (6)$$

At time, t , the number of moles from N_{A0} to N_{A1} is given as

$$t = \int_{N_{A1}}^{N_{A0}} \frac{dN_A}{-r_A V} \quad (7)$$

Since $N_A = C_A V$

It is also known that (for a constant-volume batch reactor)

$$\frac{dC_A}{dt} = r_A \quad (8)$$

The volume, the height and reacting surface can be obtained that is similar to either Fig 1 or Fig 2, depending on the surface area.

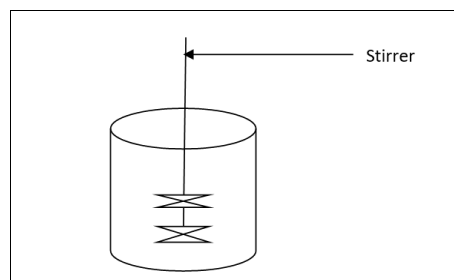


Fig 1: batch reactor with a circular base

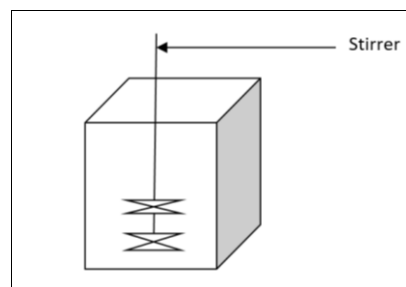


Fig 2: Batch reactor with a rectangular base

Since the method of production is local, no special attention was taken to consider the types of reactions that were present in the reactor

These were the steps taken for the production of the Local balm:

1. The plate (heater) was prepared and heating was set.
2. 125g of Petroleum Jelly was measured and placed into a beaker
3. The beaker was placed on the top of the hot plate to melt the petroleum jelly. The content of the beaker was stirred for homogeneous mixture.
4. 16.79g of wax was added into the melted petroleum jelly and the content was again stirred all together.
5. A pinch of industrial camphor was added into the mixture and the content was stirred until the camphor also melted.
6. 0.3g of menthol crystals was add into the mixture again then content was all together stirred.
7. 2.67g of the Eucalyptus oil was added to the content and again all together stirred.
8. 4.50g of Methisellate was added and content stirred all together.
9. 143.45g of paraffin oil was finally added to the content and stirred all together to produce the balm.

The product (balm) was then turned into the containers used for storage immediately as it was brought down in the beaker from the hot plate. This was because the whole mixture solidifies as it gets cold. Stirring it while it is hot makes the balm smoother in the container.

4. Conclusion

The cylindrical batch reactor was used. In a batch reactor, the height of the reactor used depends on the quantity of substances used. The height used in this study was about 30cm and the cylindrical radius was 10cm. Though the properties of the balm produced in this study were not

scientifically measured, a smooth balm was produced with constant stirring that served its purpose.

5. References

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