

Objective

Paraffin oil and gum arabic are used in the formulation of oil-in-water emulsion type, which has a lot of applications in drug delivery either as a medicament or as a vehicle. In hospital pharmacy, the emulsion for intravenous administration, for example, must be oil-in-water type. However, a good stability is required. This study aimed to investigate effects of two parameters, i.e., gum arabic grades and mixing rate on stability of paraffin oil emulsions.

Study design

- ❖ Distilled water was used as dispersant phase (75%) and paraffin oil as dispersed phase (20%).
 - ❖ Tween 80 and Span 80 served as mix surfactants (60/40).
- ❖ The formulation was performed according to the HLB (Lipophilic Balance-Hydrophilic) method.
 - ❖ Gum arabic concentrations ranging from 2.5 to 10% w/w were used.
- ❖ The stability of the emulsions was evaluated by centrifugation at 4000 rpm for 15 min.
 - ❖ The creamer index (IC) was used for the interpretation of the results.
 - ❖ The emulsions thus prepared are mixed at 4000, 8000, 16000 rpm for 10 min.

Results

- ❖ Creaming index of emulsions was ranged from 29 to 30% with HLB of 10.72.
- ❖ High levels of gum arabic (10, 7.5 and 5% [w/w]) were increased the creaming, therefore the stability was decreased.
- ❖ After addition of 2.5% (w/w) of gum Arabic, 1,6% creaming was observed (Figure 1).
- ❖ In 3% (w/w) gum Arabic containing emulsion, no creaming was observed.

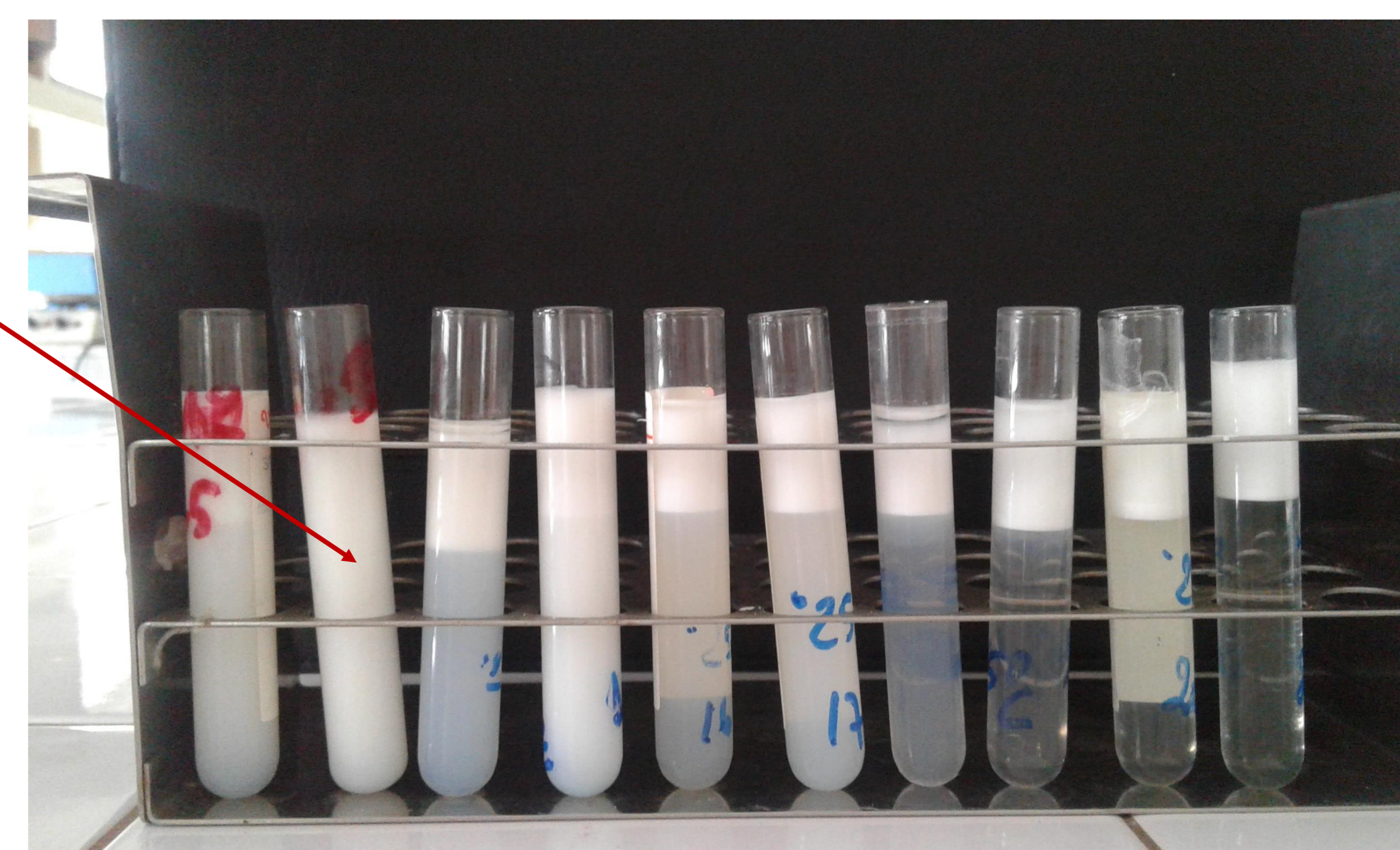


Figure 1: Emulsion stability after addition of arabic gum

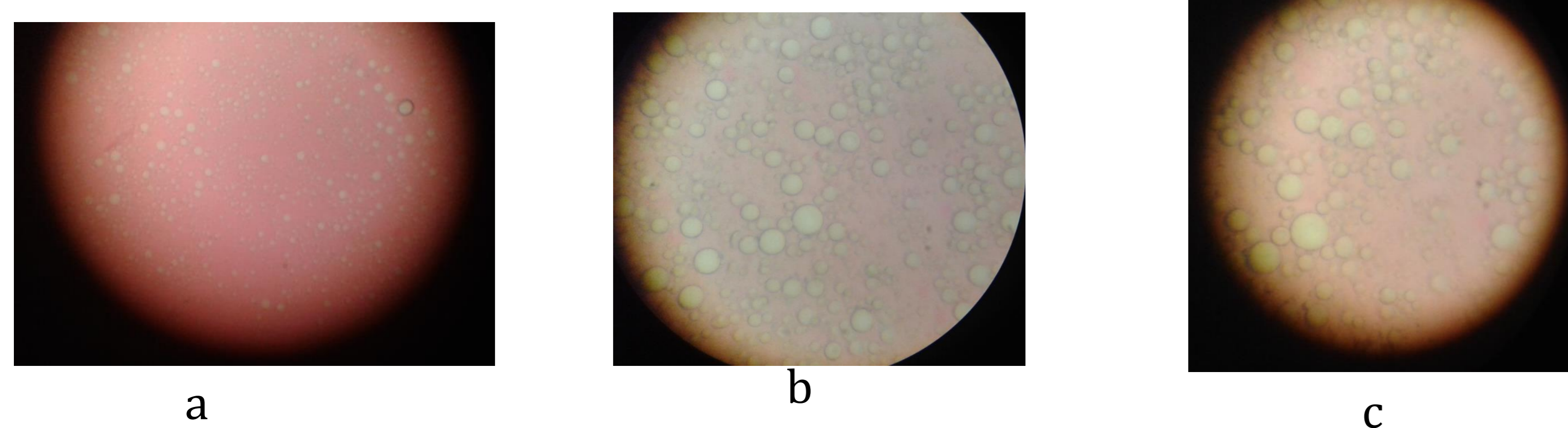


Figure 2: Microscopic appearance of the emulsion prepared at 16000 (a), 8000 (b) and 4000 (c) rpm.

- ❖ Microscopic images of emulsions mixed at 4000, 8000 and 16000 rpm, showed that emulsion prepared at 16000 rpm had homogeneously distributed individual small droplets with no sign of flocculation as compared to the others (Figure 2).

Discussion and Conclusion

The effects of the concentration of arabic gum on the stability of liquid paraffin emulsion are significantly different. The present experiment has shown that a concentration of 3% w/w gum arabic, and a mixing rate of 16000 rpm provided the optimum stability of oil paraffin emulsion.

References

L. Ramin, and al. Soy Protein Isolate and Gum Arabic Composite Affects Stability of Beverage Emulsion. Iranian Journal of Chemical Engineering Vol. 6, No. 2 (Spring), 2009, IChE