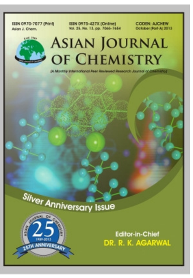
Asian Journal of Chemistry; Vol. 25, No. 15 (2013), 8607-8610

ASIAN JOURNAL OF CHEMISTRY

http://dx.doi.org/10.14233/ajchem.2013.14860A



Influence of Various Parameters on the Stability of a Paste Foamed

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(*Received*: 23 November 2012; *Accepted*: 26 August 2013) AJC-14007

This study aims to investigate the influence of various parameters on the properties and quality of a foamed paste for printing with reactive dyes. The results show that the paste foamed has a lower viscosity than the paste usually because of the small amount of surfactant implementation which provides a better dyeing efficiency and water savings Thus, the fastness of fabrics printed with the paste foamed are the same as regular paste.

Key Words: Printing, Foamed paste, Reactive dye, Stability.

INTRODUCTION

Today, drafting of the energy consumption, water consumption and saves rank of the environment have become major concerns of entreprises[1]. The current trend is the minimization of the quality of water driven by the impregnated fabric. In the textile finishing chemicals and dyes are applied to the textile material by impregnation by excess bath. Surplus amount will be subsequently removed to 60-120 % by weight of dry textile.

Excess water is used for thinning and consistently apply chemicals to the textile. Then this water is removed by evaporation during drying.

Generally, it is said that energy costs are proportional to the amount of water to evaporate[2]. A 10 % reduction in the rate of squeezing saves 20 kg of fuel per tonne of textiles to dry[3].

The present work aims to study factors influencing the preparation, properties and quality of the paste foamed printing with reactive dyes.

TABLE-1
COMPOSITION OF THE PASTE FOAMED OPTIMIZED

Chemicals	Paste foamed (%)	Paste de Draa Ben KHedda
Procion red dye	3.0	3.0
Urea 4HB	4.0	4.0
Ludigol	1.0	1.0
Sodium bicarbonate	1.5	1.5
Aliginate sodium	0.5	4.0
Cottoclarine KD/OK	0.1	–
Soap	1.0	–

EXPERIMENTAL

Determination of experimental parameters

Choice of surfactant: The results show that the ionic surfactant cottoclarin CD/OK foam more than the non-ionic surfactant Sandozin NIT. This can be explained by the low water solubility of the latter relative to the first which also loads negatively who oppose the destruction of the lamellar layers. Because of its foaming importantly, we will work with the cottoclarin CD/OK.

Concentration of surfactant cottoclarin CD/OK: Increasing the concentration of surfactants from 0.2 to 2.5 g/L leads to an improvement in the volume expansion. This applies to the different speeds and stirring times. The volume expansion is not significant. This phenomenon is explained by the fact that in the concentration range of 0.2-1.0 g/L, the distance between the molecule of surfactant is great and the film strength of interlamellar liquid is small, which favours further expansion of the solution. beyond 1 g/L the distance between the molecules of surfactants and decreases the strength of the lamellar layer augment these conditions do not favour larger expansions. For these reasons, we chose a working concentration of 1 g/L.

Speed agitation: The results show that increasing the stirring rate promotes foaming. but V = 4675 min^{-1}, it begins to decrease. That is the reason we propose to work with the stirring speed contributes to the destruction of the foam.

The reduced speed of agitation another opportunity to get a little moss over, higher stirring speed contributes to the destruction of the foam.

Duration of agitation: The stirring time affects the volume of foam, from 2-7 min, it increases but in different proportions. 2-3 min, the volume increases from 630 to 730 mL, 3 to 7 min, the volume increases from 730 to 750 mL (Figs. 1-6).

Increasing the stirring time of more than two times (3-7 min) gives an increase of only 20 mL. This increase is not proportional to the expenditure of time, there is formation and destruction of the foam simultaneously.

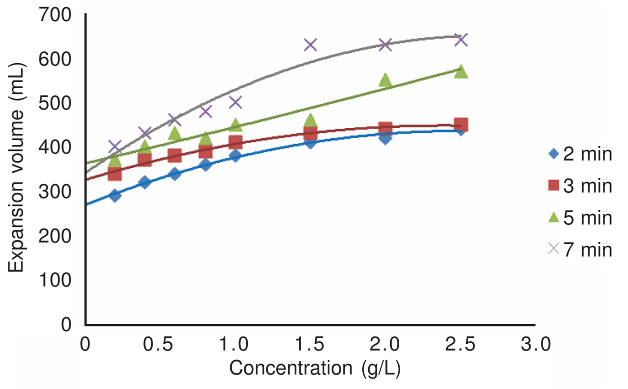

Fig. 1. Changes in volume expansion as a function of the concentration of cottoclarin KD/OK to different periods of agitation and V = 2775 rev/min

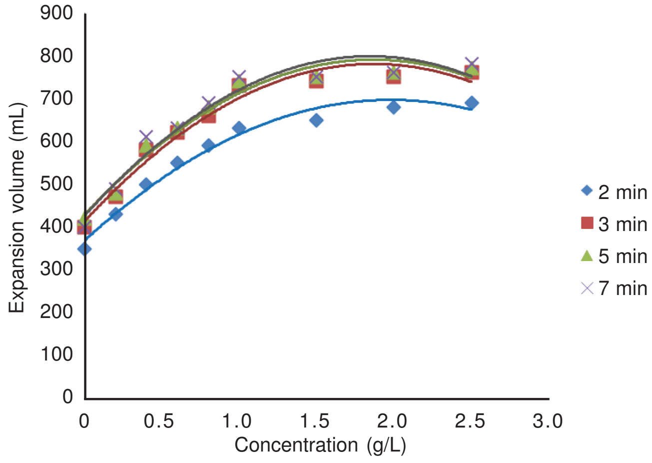

Fig. 2. Variation of volume expansion as a function of the concentration of cottoclarin KD/OK to different periods of agitation and V = 3975 rev/min

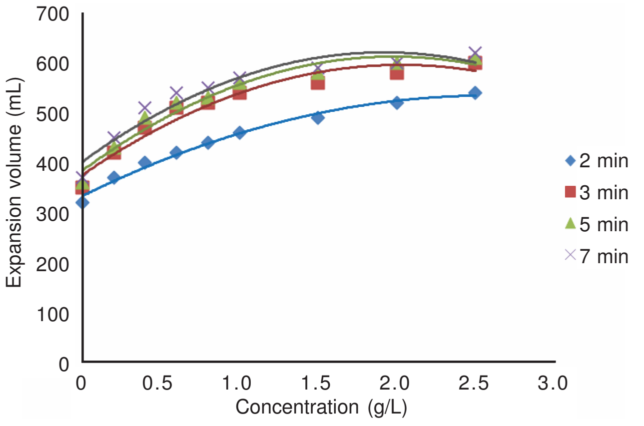

Fig. 3. Changes in volume expansion as a function of the concentration of cottoclarin KD/OK to different periods of agitation and V = 4675 rev/min

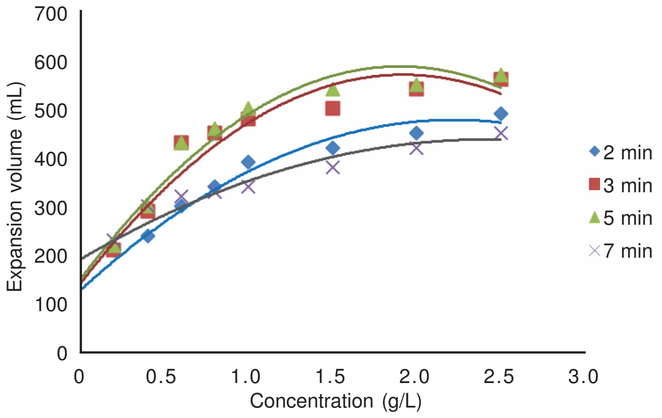

Fig. 4. Variation expansion volumes depending on the concentration of NIT Sandozin to different durations of agitation and V = 2775 rev/min

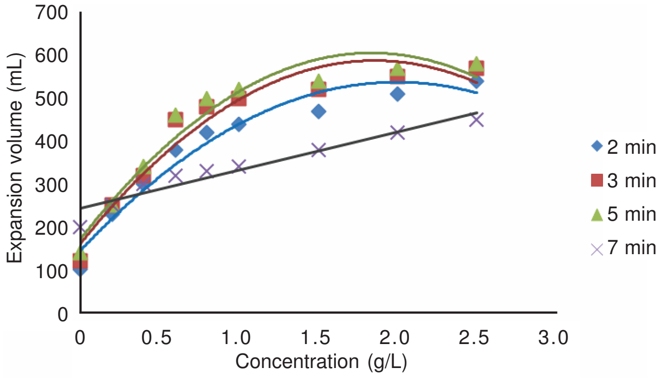

Fig. 5. Variation expansion volumes depending on the concentration of NIT Sandozin to different durations of agitation and V = 3975 rev/min

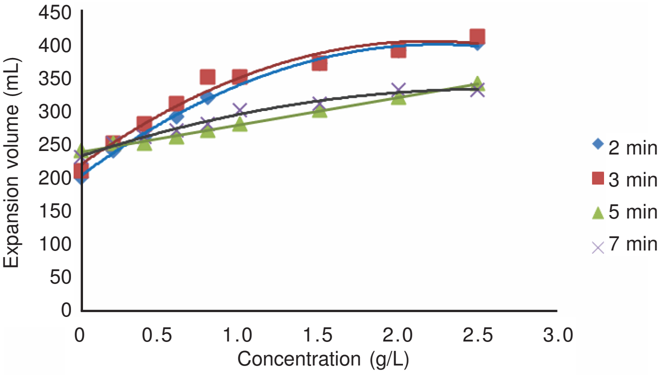

Fig. 6. Variation expansion volumes depending on the concentration of NIT sandozin to different durations of agitation and V = 4675 rev/min

RESULTS AND DISCUSSION

Influence of different products on the formation and stability of the foam in addition to cottoclarine KD/OK: The solution contains one of mousseer following products: sodium bicarbonate, urea, ludigol and thickener stabilizing.

Sodium bicarbonate, urea, ludigol: Sodium bicarbonate and urea ludigol auxiliaries are of the paste printing reactive dyes. They are soluble in water. Introduced in solutions of surfactant, they improve slightly foaming. The surface activity of surfactants is amended by the salts in their solutions. The surface tensions are reduced by the addition of salts. This activity depends salts introduced[4]. Ions also lower the more the surface tension are less hydrated. In our case. The use of these salts in the dough does not improve the frothing, but to create favorable conditions to achieve a color yield optimal. That's why we work with the quantities used in the dough and are optimized common: sodium bicarbonate (%): 1.5, urea (%): 4.0, ludigol (%): 1.0 (Figs. 7-13).

Thickeners sodium alginate carboxy methyl ecellulose: Foamed dough is a two-phase system air-liquid unstable. Over time, it collapsed. In the cases studied thickeners: sodium alginate carboxymethylecellulose. It is noted that with the increased concentration of these products, the stability increases against the foam volume decreases.

For sodium alginate, from 2.5 % concentration there is no foaming due to the high viscosity of the initial solution. It is believed that the cohesive forces of the macromolecules are larger thicker compared to the amount of air introduced into the system.

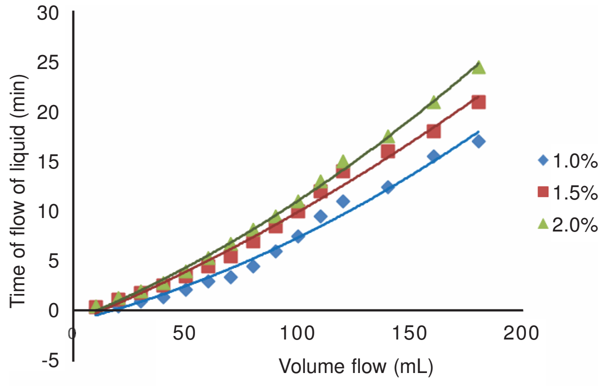

Fig. 7. Influence of sodium bicarbonate concentration on foam stability

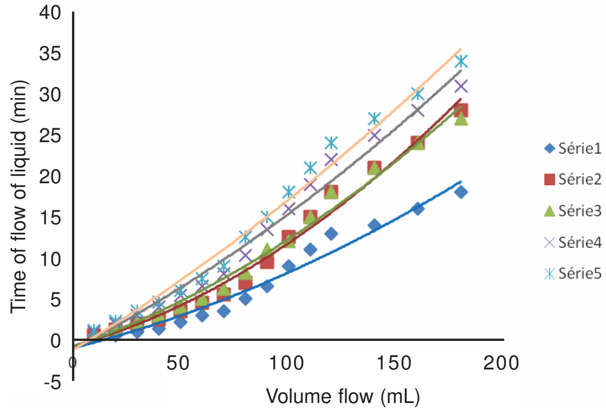

Fig. 8. Influence of urea concentration on foam stability

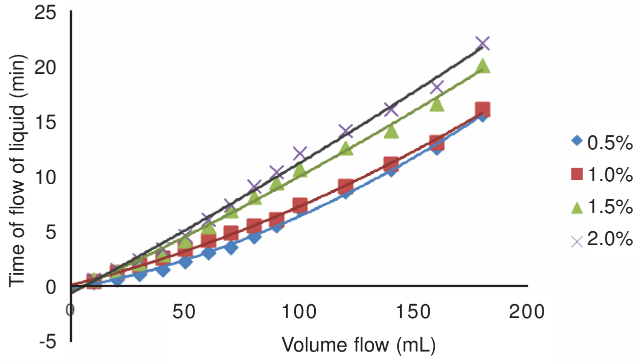

Fig. 9. Influence of the concentration of foam is ludigol stability

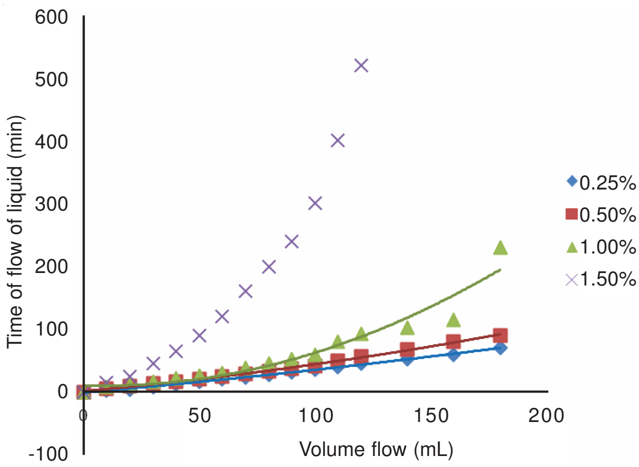

Fig. 10. Iinfluence of the concentration of sodium alginate on the stability of the foam.

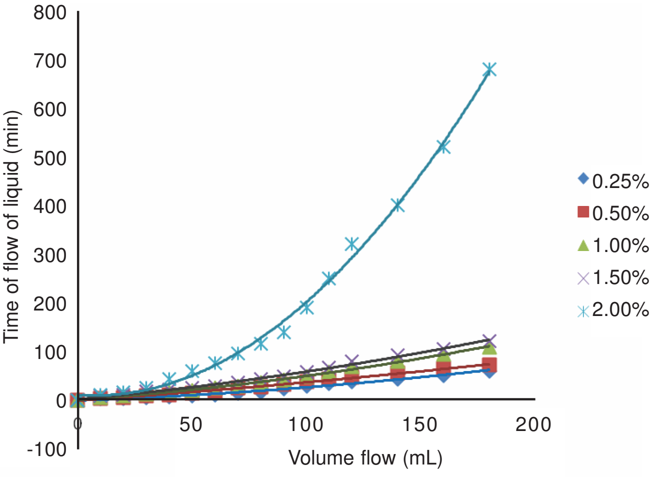

Fig. 11. Influence of CMC concentration on foam stability

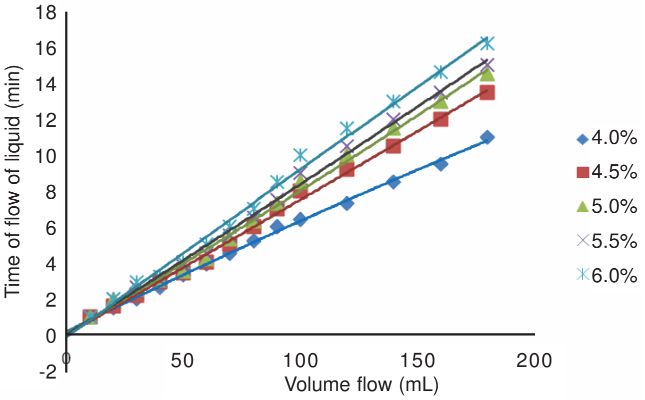

Fig. 12. Influence of glycerol concentration on foam stability

For sodium carboxymethylecellulose, the foam volume decreases more slowly because it is a thicker high dry matter content relative to sodium alginate. In other words, to have the same viscosity must be used to thicken over a low dry matter content as thickeners are not used exclusively for stabilizing. The chosen concentration is 0.5 % it provides an optimal volume of foam.

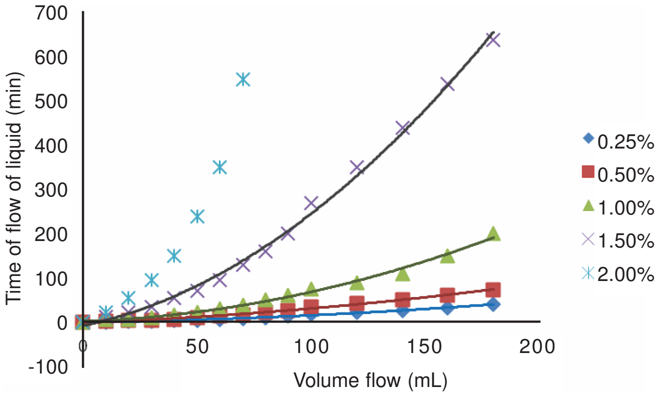

Fig. 13. Influence of soap concentration on foam stability

Technological properties

Stabilizers: household soap and glycerine: We preferred to use the soap has the glycerine, because it has a negative influence on the foaming.

Household soap contributes to the formation of the foam as it is made of fatty surfactants: Sodium stearate, sodium oleate, sodium laurate and sodium palmitate *etc*.

The increase in foam stability by the soap is explained by the increased strength of the air-liquid boundary layer with increasing concentration of surfactants in addition to the high viscosity of the solution interlamellar.

Increasing the concentration of active tension by adding soap, slows the flow of liquid through the following demonstration of mechanical properties of the lamina structure by increasing the micelles formed by assembling molecules of surfactants and strengthening of the absorption layer.

The viscosity increase is conditioned by the interaction of neighboring molecules of surfactant on the liquid surface by forming laisons hydrogen.

In the case of anionic products, the flow of liquid continues until the two layers are at a minimum distance or there will be two surfaces of electrostatic repulsion charged groups that are ionized by the foaming agent preventing the thinning of the film.

In the system chosen: The cottoclarin KD/OK and household soap anionic, ranging in concentration from 0.25 to 2.5 %, we find that the volume and foam stability are improved for concentartion 0.25-1.00 %. At concentrations 1.5-2.5 % foam volume decreases and stability increases dramatically.

In textile printing, the foam should be neither too stable nor unstable. It must be stable enough just enough time to its preparation and its application on textiles. Then it must collapse to allow products to penetrate the tissue structure. Thus we opted for the 1 % concentration or expansion of the liquid is maximum and stability is average. Further stability will be enhanced by the thickener added to the printing paste as we have seen previously.

Composition and stability of dough: After having determined the optimal amounts, we composed and determined the stability of the paste foamed.

Conclusion

It is observed that the dough has a good stability. Indeed, the liquid flow is 10 mL foam is happening in 32 min or we knew that in regular printing consumption of 50 kg of dough is between 15-30 min for large surface drawings. As used 50 L tanks, foamed dough will be consumed in less than 15 min par therefore the flow will be minimal and nuances will be the same at both the beginning and end of printing.

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