THE DEACIDIFICATION OF POMANCE-OLIVE OIL

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ABSTRACT: This paper is a comparative research of traditional (chemical) and physical deacidification of crude olive pomance oil,performed with soda and ethylene chloride (40,60,75%) extraction of free fatty acids(FFA) from miscella (1:1,1:2) in six stages.Physical deacidification of 1:2 miscella by extraction of FFA with ethylene chloride 75% give the best results,in terms of deacidification yield (DY-97.30%),peroxide value (PV-1.8 mEq/kg) and organoleptic grading(OG-6.3).

Keywords: olive-pomance oil,deacidification,ethylene chloride,deacidification Yield

1. INTRODUCTION

Olive oil is a gift of the nature because of it's medical and nutritional benefits,the positive effect on the digestive and cardiovascular system,improving health and antiaging effect.

The European regulation for obtaining,elaboration,industrialisation and comercialisation of olive oil is Regulation 2472/97.The comercial type of olive oil is determined by it's acidity degree,organoleptic grading and the presents of defects.

Virgine olive oil is obtaining by pressing (taditional system) or by centrifugation of vegetable paste generated by the grinding of fruits.The pomance-olive oil can be obtained from the solid part which remain after grinding and pressing of fruits. The crude pomance-olive oil is obtained by extraction with etylene chloride and exano,it's deacidification is alkaline,with soda at high temperature.The refined pomance-olive oil is mixed,in a proportion of 90/10 or 80/20%,with virgine olive oil and comercial pomance-olive oil is obtained[3,5].

Liquid-liquid extraction of sulfur olive oil miscella in hexane with aqueous ethanol solution were investigated in bench-scale single-stage extraction[1] and multi-stage cross counter-current extractions with 70 and 80% ethanol in optimal conditions[2].

This study give the comparative results of traditional and physical deacidification of crude olive-pomance oil performed with soda and ethylene chloride40,60,75% extraction of FFA from miscella (1:1,1:2) in six stages.

2. MATERIALS&METHODS

The crude olive-pomance oil were obtained by laboratory extraction with ethylene chloride from cakes (vegetable solide fraction) generated after centrifugation of olive fruit paste (Figure 1).

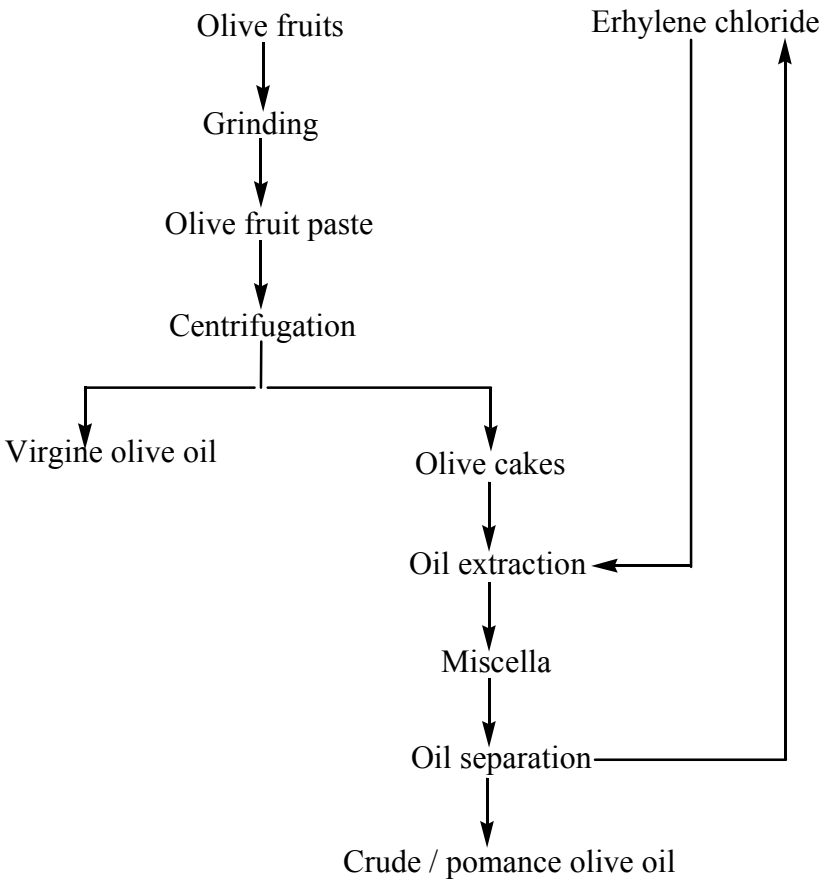

Figure 1 The process of crude olive-pomance oil obtaining

The traditional deacidification were performed with NaOH 20Bé,70^{0}C,30',with moderate agitation.The physical deacidification were performed by etylene chloride 40,60,75% multi stage (I-VI) extraction in etylene chloride miscella stage (1:1,1:2).

The deacidification yield (DY) were determined with de following formula:

$$DY\%=FFA_0\text{-}FFA_N/FFA_0X100,$$

in wich FFA_0 is the original FFA content of crude-pamance oil and FFA_N is the after N-stageas extraction the FFA content of pomance oil (N=I-VI).

Peroxide value (PV) and organoleptic grading (OG) were determined by AOAC methods [4] and UE Regulation 2472/97.

3. RESULTS&DISCUSSIONS

The evolution of deacidification yield (DY) of miscella pomance oil 1:1 with ethylene chloride in physical refined is presented in Table 1.The evolution of deacidification yield (DY) of miscella pomance oil 1:2 with ethylene chloride in physical refined is presented in Table 2.

The deacidification yield in chemical refining of crude olive-pomance oil were 96.5%.

Table 1 The deacidification yield (DY) of miscella olive- pomance oil 1:1 with etylene chloride in physical refining

Stage	***DY %***		
	Etylene chloride concentration, %		
	40	**60**	**75**
I	28.60	30.32	45.80
II	51.86	54.40	71.55
III	75.85	78.59	86.30
IV	84.15	87.54	91.83
V	87.27	90.08	95.35
VI	91.09	93.40	97.30

Table 2 The deacidification yield (DY) of miscella olive-pomance oil 1:2 with etylene chloride in physical refining

Stage	***DY %***		
	Etylene chloride concentration, %		
	40	**60**	**75**
I	35.71	39.64	51.14
II	63.32	65.25	80.17
III	77.82	84.85	92.05
IV	85.24	90.35	94.40
V	90.21	93.64	96.67
VI	92.87	95.27	98.10

The best results in physical deacidification we obtain in the case of 1:2 miscella extracted with ethylene chloride 75%,after six stages the DY were 98.10%,comparable with the result of 1:1 miscella extraction,in the same conditions (97.30%). The DY have a gradually positive evolution in stage I to VI of liquid-liquid extraction,with a dramatic increasing in the transition by I to II step of physical deacidification,mostly in 1:2 miscella. The ethylene chloride solution with 40 and 60% concentration give modest resuts in the first two stages but after five multiple stages of FFA extraction the DY were comparable in all type of extraction reagent.After six stages of physical deacidification there are no significantilly differences of DY from 1:1 and 1:2 miscella extracted with the same type of reagent.The diferences were significantilly higher,in all stages,between the results of 75% and 40% extraction.

The DY in chemical refining(96.50%) is comparable with six stages extraction of 1:2 miscella with 60% ethylene chloride but the DY for 75% extraction reagent for miscella 1:1 (97.30%) and 1:2 miscella (98.10%) were significantlly higher.

Because the final DY is imposed in refining process, we determined the impact of the physical and chemical deacidification of olive-pomance oil on organoleptic grading(Table3) and peroxide value(Table 4).The both experimental groups of results indicated a much better comercial value of physical deacidification than the chemical one.In the best case of physical deacidification we obtain a PV OF 1.8 mEq/kg,lower than half of PV in chemical deacidification (3.8mEq/kg).Chemical reagent and the agressive condition of processing promote the autooxidation and the remaining FFA play like autooxidative promotor.The chemical processing have a badly impact on the OG of oil too, wich is 5.3, a grading of ordinary comercial olive oil.
In physical deacidification we obtain much better resuts in all cases, the best results in 1:2 miscella extracted with 75% ethylene chloride(6.3),grading wich place the oil in the group of comercial virgine olive oil-like.

4. CONCLUSION

The physical deacidification of olive-pomance oil give, after five-six stages of extraction with ethylene chloride, better resuts than chemical one, in terms of DY,OG and PV.

The best results in physical deacidification we obtain in case of ethylene chloride 75%extraction of FFA from miscella of olive-pomance oil.

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