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## **Preparation of Medicinal Petroleum Jelly using Local Petroleum Waxes**

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### **Abstract**

*Petroleum waxes are mainly derived from paraffinic crudes. These waxes must be removed from lubricant base oils through a dewaxing process to avoid affecting oil performance at low temperatures. The waxes themselves have uses.*

*This paper describes successful attempts to select the optimum conditions for sulphonation and/or hydrogenation of local waxes to obtain medicinal macro- and microcrystalline waxes suitable for use in petroleum jelly blends that meet medicinal specifications.*

*Deoiling was carried out to separate the oil from the wax samples. Concentrated and fuming sulphuric acids were used as sulphonating agents. Sulphonation processes were carried out at different temperatures, stirring speeds, and digestion times. The optimum sulphonation conditions, which give 0.007 UV absorbance at 290 nm and the highest yield, were achieved using 28% concentrated sulphuric acid.*

*The optimum hydrogenation conditions were achieved using a Ni/Mo catalyst at 105°C and 60 bar for paraffin wax and 180°C and 100 bar for petrolatum, for 30 min for both types of waxes.*

*Analysis and field trials of the blended petroleum jelly showed that these blends meet British Pharmacopoeia specifications.*

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### **Keywords**

microcrystalline wax, macrocrystalline wax, medicinal petroleum jelly, sulphonation, hydrogenation, UV absorbance, British Pharmacopoeia

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### **INTRODUCTION**

Petroleum jelly or Vaseline consists of different petroleum waxes, depending upon its type (white or yellow soft paraffins), and white oil.

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Petroleum jelly is a highly refined product used in the cosmetics, food, and pharmaceutical industries. This product must normally meet British and US Pharmacopoeia standards.

Petroleum waxes are broadly defined as the waxes naturally present in the various fractions of crude petroleum. The presence of wax in lubricating oils is detrimental, and it must be removed from the oil by a dewaxing process.

Commercial petroleum waxes may be divided into three principal groups: paraffin waxes, microcrystalline waxes, and petrolatum. Paraffin wax is refined with a very low oil content, is white with some degree of translucency, is almost tasteless and odourless, and is slightly greasy to the touch. Microcrystalline wax is usually more opaque than paraffin wax, and may vary from soft and plastic to hard and brittle, and from white to dark brown in colour.

To prepare medicinal petroleum jelly, the aromatic content of the waxes used must be reduced to a minimum before use. Sulphonation of paraffinic compounds was carried out by Kosturova *et al.*,<sup>1</sup> with a 7.5:92.5 mixture of SO<sub>3</sub> and N at 50–55°C, giving products with low wt.% aromatic compounds. The presence of 1.3–1.5% of 92–93% H<sub>2</sub>SO<sub>4</sub> decreases the formation and viscosity of waste acid sludge.

The removal of aromatic traces from paraffins was accomplished by catalytic hydrogenation<sup>2</sup> at relatively mild conditions (200–250°C, 20 MPa H pressure, 0.1–0.3 h<sup>-1</sup> space velocity) over a newly developed Ni–Al<sub>2</sub>O<sub>3</sub>, Ni–Si<sub>2</sub>, or Pt–Al<sub>2</sub>O<sub>3</sub> catalyst. The optimum Ni content was ~50%, and for Pt it was 0.7%, providing Pt was uniformly dispersed on the carrier. The hydrogenation tests were conducted on technical grade paraffins.

Himmel *et al.*<sup>3</sup> prepared paraffin waxes for use in the food and pharmaceutical industries by hydrogenation. The paraffin waxes were hydrotreated in one step in the presence of a Mo–Ni catalyst with a special promoter (unidentified).

Nagarajan<sup>4</sup> deals with the performance of acid-treated clay over ordinary bleaching clay in the manufacture of microcrystalline wax. Acid-treated clay has a superior ability to absorb impurities and colouring matter and is said to be three to four times as efficient as ordinary clay.

The aim of the present work was to produce petroleum jelly of medicinal grade using the different wax types available

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**Table 1 Properties of wax samples tested**

<i>Test</i>	<i>PWA</i>	<i>Pet. W</i>
Melting point, °C, ASTM D-127	53	65
Oil content, wt.%, ASTM D-721	3	11.01
Needle penetration, ASTM D-1321	14	45
UV absorbance at 290 nm, ASTM D-2008	0.035	0.198
Colour, ASTM D-1500	0	2

**Table 2 Properties of white oil**

<i>Test</i>	<i>Reference</i>	<i>Imported white oil</i>	<i>Prepared local medicinal white oil</i>
Specific gravity at 15°C	D-1298	0.8529	0.8519
Kin. visc. at 40°C, cSt	D-445	15.72	19.98
Kin. visc. at 100°C, cSt	D-445	3.5	4.13
VI	D-2270	99	107
Pour point, °C	D-97	-18	-3
TAN, mg KOH/g sample	D-664	Nil	0.01
Conradson carbon, wt.%	D-189	0.01	0.04
Flash point (PMCC), °C	D-93	118	118
Flash point (PMOC), °C	IP 35	184	162
Aniline point, °C	D-611	110	112
Ash, wt.%	D-482	Nil	Nil
Average mol. wt.	D-2505	353	375
Average mol. wt. (OS.)	-	340	376
Colour	D-1500	0	0
Unsulphonatable content, wt.%	Shell SMS405-6	99.5	99.2
<i>Hydrocarbon classes</i>			
Saturates, wt.%		99	99.6
Mono-aromatics, wt.%		1	0.4
Di-aromatics, wt.%		Nil	Nil
Poly-aromatics, wt.%		Nil	Nil

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from local Middle Eastern refineries using either the sulphonation process and/or the hydrogenation process. Also, white medicinal oil, either imported or locally rerefined, was incorporated into the petroleum jelly blend with specifications that meet British Pharmacopoeia.

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**EXPERIMENTAL:****Wax selection**

Two wax samples, i.e., macrocrystalline wax (paraffin wax, PWA) produced by the Amerya refinery, and microcrystalline wax (Pet. W) produced by the Alexandria refinery, and two oil samples, a medicinal white oil prepared from technical white oil, produced by Amerya refinery, and an imported medicinal white oil, were selected to carry out this study.

The physical and chemical properties of the wax and the oil samples used were determined as received according to standard and non-standard test methods. **Tables 1 and 2** give the results obtained for both wax and oil samples respectively.

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**Treatment techniques**

The two wax samples (PWA and Pet. W) were treated by applying the following processes:

*Deoiling* This was carried out using methyl isobutyl ketone (MIBK) as a solvent. The steps in this process were as follows:

- (1) About 1500 ml MIBK was added to 100 g melted wax with stirring until homogeneity of the mixture was achieved.
- (2) The mixture was cooled to get the cake, which separates below  $-10$  to  $-30^{\circ}\text{C}$ , for 1.5–4.5 h. The cooling temperature and time depend upon the type of wax.
- (3) The precipitated waxes are filtered off, while the solvent separated oil mixture is distilled to recover the MIBK.
- (4) The previous steps are repeated three or four times to minimise the oil content of the waxes.

*Sulphonation* Two sulphonation agents were used at different percentages in the acid treatment. These were: concentrated (conc.) sulphuric acid, and fuming sulphuric acid (oleum).

The different acid percentages were used to select the optimum percentage of each sulphonation agent that gave the best medicinal specifications of the wax.

Clay/acid treatment was successfully applied to PWA, but it failed with Pet. W. The treatment procedure for both conc.

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**Table 3 Properties of the catalyst Ni/Mo**

Type	HR 346
Shape	Extrudate 1.2 mm
Bulk density*	0.75±0.005 g/ml
Chemical composition	NiO 3%, MoO 14%
Weight	20 g
Manufacturer	Procatalyse
Life time	exp. 1 year

\* = sock-loading density.

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and fuming sulphuric acids was carried out according to the following steps:

- (1) The deoiled wax sample was melted at 100°C, then treated with about 12 wt.% clay, followed by a uniform addition of different percentages of either conc. or fuming sulphuric acids (10, 20, and 28% conc. sulphuric acid, and 5, 7, 10, and 14% fuming sulphuric acid), with constant agitation.
- (2) The acid sludge was allowed to form in large amounts in the initial stages, and then drained off at regular intervals.
- (3) After completion of the clay/acid treatment and removal of the acid sludge, the treated wax was neutralised with a sufficient amount of Na<sub>2</sub>CO<sub>3</sub>, then the neutralised wax filtered off, giving a yield of about 50–85%.

*Clay treatment* Since clay/acid treatment in one step was found to be unsuccessful with the Pet. W, clay treatment on its own with different percentages (10, 20 and 30%) was carried out on this as follows:

- (1) The wax (100 g) was heated to 170–180°C with stirring.
- (2) Clay (10, 20, and 30 g) was gradually added to the heated wax with continuous stirring for 30 min at the temperature mentioned.
- (3) The treated wax was then filtered off; yield was 65–88%.

*Hydrogenation* Several one-stage hydrogenation processes using Ni/Mo as a catalyst, at different conditions of pressure,

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temperature, and times of hydrogenation, were applied to each of the three waxes tested, to select the optimum hydrogenation conditions to produce waxes meeting medicinal specifications. The properties of the catalyst are listed in **Table 3**.

Since the hydrogenation processes were carried out in a batch reactor, the hydrogenated wax obtained included the catalyst; therefore, the wax had to be melted and the catalyst filtered off before the properties of the wax were determined.

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## RESULTS AND DISCUSSION

**Tables 1 and 2** show the results obtained for the analysis of wax and oil samples respectively.

The results for wax samples PWA and Pet. W indicate that the tested samples have high melting points which can be attributed to their low oil contents.

The imported white oil sample has higher wt.% saturates and lower wt.% mono-aromatics than those in the technical white oil sample produced by the Amerya refinery. This difference applied also to the Conradson carbon, aniline point, and unsulphonatable content.

The viscosity index and pour point of the imported sample, compared with those of the technical sample, showed the imported one to be more naphthenic and less paraffinic than the technical one.

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## Sulphonation treatment

Acid treatment with simultaneous addition of the clay in one step was carried out, the main objective being to activate the clay *in situ* with the material. The treated wax was kept under constant agitation for nearly 30 min, i.e., until completion of the acid treatment. Simultaneous activation of the clay by sulphuric acid and removal of asphaltenes and resins took place. Activated clay decolourised the wax, and to a certain extent was removed along with the acid sludge.

Generally, this process when carried out on the deoiled paraffin wax PWA showed a very good yield of 70–85%, cf. **Table 4**.

The advantages of this process are that:

- (1) The time taken to carry out the two processes (acid treatment and clay treatment) in two steps can be much reduced as the two treatments are done simultaneously.

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**Table 4 Properties of PWA wax before and after treatment with concentrated and fuming sulphuric acids**

	<i>Before treatment</i>	<i>After treatment</i>					
		<i>Conc. sulphuric acid</i>			<i>Fuming sulphuric acid</i>		
		<i>10%</i>	<i>20%</i>	<i>28%</i>	<i>5%</i>	<i>7%</i>	<i>14%</i>
Drop melting point, °C ASTM D-127	53	62	63	63	63	63	63
Oil content, wt.% ASTM D-721	3	0.5	0.5	0.4	0.61	0.55	0.5
Needle penetration ASTM D-1321	14	10	10	9	12	11	10
Colour ASTM D-1500	0 White	0 White	0 White	0 Snow white	0 White	0 White	0 White
UV absorbance at 290 nm ASTM D-2008	0.035	0.012	0.011	0.007	0.027	0.019	0.012
Yield, %	100	87	86	85	88	87	86

(2) The frequency of filter cleaning could be reduced as a considerable amount of the added clay gets removed along with the drainage of the acid sludge.

(3) The time saving will increase the production rate, and the manufacturing cost will come down because of the complete elimination of charcoal.

On the other hand, this process failed when applied to the deoiled microcrystalline wax sample (Pet.W); this may be attributed to the nature of this wax.

#### Clay treatment

Since clay/acid treatment failed when applied to deoiled microcrystalline wax, only the clay treatment was carried out on this sample, Pet. W; the waxes obtained had good colour, in addition to the process itself giving a good yield, 65–88%, cf. **Table 5** (overleaf).

#### Treated waxes

**Table 4** gives the physical and chemical properties of PWA before and after treatment with different percentages of conc. and fuming sulphuric acids.

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**Table 5 Properties of petrolatum Pet. W before and after clay treatment**

	<i>Before treatment</i>	<i>After treatment</i>		
	<i>(after deoiling)</i>	<i>10% clay</i>	<i>20% clay</i>	<i>30% clay</i>
Drop melting point, °C ASTM D-127	76	78	78	79
Oil content, wt.% ASTM D-721	3.5	0.32	0.3	0.25
Needle penetration ASTM D-1321	30	22	22	20
Colour ASTM D-1500	2 Yellow	1 Pale yellow	1 Pale yellow	1 Pale yellow
UV absorbance at 290 nm ASTM D-2008	0.198	0.168	0.149	0.132
Yield, %	100	88	76.5	64.7

From **Table 4**, a comparison between the results obtained indicates the following:

- The melting points of the tested waxes increased after treatment with all percentages of the two sulphonating agents, conc. and fuming sulphuric acids.
- The wt.% oil content of the tested wax was reduced after treatment with only 28% conc. sulphuric acid to be within the limits of standard specifications (<0.5%).
- The clay and acid treatment resulted in lowering penetration values for the tested wax sample.
- A remarkable improvement in colour can be noticed after treatment with only 28% conc. sulphuric acid, which gave a snow-white colour.
- The yields obtained were excellent in all treatments (for PWA) with different percentages of either conc. or fuming sulphuric acids.
- The best improvement in UV absorbance at 290 nm occurred after treatment with 28% conc. sulphuric acid.

This percentage (28% conc. sulphuric acid) can be considered as the optimum acid percentage to achieve optimum wax



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**Table 6 Hydrogenation conditions for PWA and UV absorbance after treatment**

<i>Trial</i>	<i>Hydrogenation conditions</i>				<i>UV absorbance at 290 nm after treatment (0.035 before treatment)</i>
	<i>Pressure (bar)</i>	<i>Temp. (°C)</i>	<i>Time (min)</i>	<i>Catalyst</i>	
1	60	150	20	Ni/Mo	0.029
2	60	150	30	Ni/Mo	0.012
3	60	150	45	Ni/Mo	0.016
4	40	150	30	Ni/Mo	0.031
5	80	150	30	Ni/Mo	0.020
6	60	120	30	Ni/Mo	0.032
7	60	180	30	Ni/Mo	0.018

**Table 7 Hydrogenation conditions for Pet. W and UV absorbance after treatment**

<i>Trial</i>	<i>Hydrogenation conditions</i>				<i>UV absorbance at 290 nm after treatment (0.198 before treatment)</i>
	<i>Pressure (bar)</i>	<i>Temp. (°C)</i>	<i>Time (min)</i>	<i>Catalyst</i>	
1	100	180	20	Ni/Mo	0.156
2	100	180	30	Ni/Mo	0.132
3	100	180	45	Ni/Mo	0.134
4	80	180	30	Ni/Mo	0.179
5	120	180	30	Ni/Mo	0.140
6	100	150	30	Ni/Mo	0.166
7	100	200	30	Ni/Mo	0.138

properties that allowed it to be incorporated in medicinal petroleum jelly blends.

From **Table 5**, which gives the physical and chemical properties of the petrolatum before and after clay treatment, it can be observed that the clay treatment was successful in

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increasing the drop melting point, decreasing both wt.% oil content and colour to within the limits of standard specifications for microcrystalline wax (<1% and pale yellow). Needle penetration and UV absorbance at 290 nm decreased after clay treatment with different clay percentages. The decrease in UV absorbance at 290 nm was about 15, 25, and 33% with yields of 88, 76.5, and 64.7% of the products, using 10, 20, and 30% clay, respectively.

Accordingly, 20% can be economically selected as the best percentage, since the improvement in the physical and chemical properties achieved at 30% clay was not very great with respect to those achieved at 20% clay, while the yield was lower by about 12%.

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### Hydrogenation treatment

**Tables 6 and 7** include the different hydrogenation conditions and the UV absorbance at 290 nm of the PWA paraffin wax and Pet. W petrolatum, respectively.

From **Table 6**, the following can be noted:

- For hydrogenation of the PWA paraffin wax at constant pressure (60 bar) and constant temperature (150°C), using an Ni/Mo catalyst and different times, 20, 30, and 45 min, the lowest UV absorbance at 290 nm (0.012) occurred using 30 min as the hydrogenation time (trials 1, 2, and 3).
- Trials 4, 2, and 5, with a constant hydrogenation temperature (150°C) and hydrogenation time of 30 min, the same catalyst (Ni/Mo), and different pressures of 40, 60, and 80 bar respectively, show that the optimum pressure is 60 bar, which gives the lowest UV absorbance at 290 nm (0.012).
- For trials 6, 2, and 7 with a constant hydrogenation time of 30 min, constant pressure (60 bar), Ni/Mo as a catalyst and different temperatures of 120, 150, and 180°C, respectively, the temperature which gives the lowest UV absorbance at 290 nm (0.012) is 150°C.

From **Table 7**, the following can be observed:

- For the hydrogenation of petrolatum sample Pet. W at constant pressure (100 bar), constant temperature (180°C), and for different times (20, 30, and 45 min), using Ni/Mo as a catalyst (trials 1, 2, and 3), the lowest UV absorbance at 290 nm (0.132) was observed at hydrogenation time 30 min (trial 2).

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**Table 8 Optimum hydrogenation conditions of tested wax samples**

Wax	Hydrogenation conditions				
	Pressure (bar)	Temp. (°C)	Time (min)	Catalyst	H <sub>2</sub> ratio
Macrocrystalline wax (PWA)	60	150	30	Ni/Mo (HR 346)	56 L/L
Microcrystalline wax (Pet. W)	100	180	30	Ni/Mo (HR 346)	56 L/L

**Table 9 Properties of wax samples before and after hydrogenation**

Test	PWA		Pet. W	
	Before	After	Before (after deoiling)	After
Drop melting point, °C ASTM D-127	62	64	76	79
Oil content, wt.% ASTM D-721	3	0.4	3.5	0.25
Needle penetration ASTM D-1321	14	8	30	18
UV absorbance at 290 nm ASTM D-2008	0.035	0.012	0.198	0.132
Colour ASTM D-1500	0 White	0 Snow white	2 Yellow	1 Pale yellow

- The results of UV absorbance at 290 nm for trials 4, 2, and 5 indicate that the lowest (0.132), trial 2, was achieved at 100 bar, rather than 80 or 120 bar, at the same temperature (180°C), and the same time (30 min), and with Ni/Mo as catalyst.
- For trials 6, 2, and 7, with constant pressure (100 bar), constant time (30 min), and different temperatures (120, 180, and 200°C), using Ni/Mo as a catalyst, the lowest UV absorbance at 290 nm was observed at temperature 180°C (trial 2).

Accordingly, we can summarise the optimum hydrogenation conditions, which give waxes with the lowest UV absorbance at 290 nm, as in **Table 8**.

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The optimum hydrogenation conditions can be considered as suitable conditions to obtain a wax having the best properties for incorporation in medicinal petroleum jelly blends.

These conditions gave excellent yields (>99%) for the tested wax samples, which are much better than those obtained with the sulphonation treatment of the same samples, the yields being PWA 85% and Pet. W 64.7%.

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### Hydrogenated waxes properties

A comparison of the physical and chemical properties of the tested wax samples before and after hydrogenation in optimum conditions, shown in **Table 9**, indicates the following:

- Drop melting points increase, while wt.% oil content, needle penetration, and UV absorbance at 290 nm decrease as a result of hydrogenation.
- Improvements in the colour of the waxes were observed after hydrogenation.

The resultant waxes had the properties allowing them to be incorporated in medicinal petroleum jelly blends.

These conditions gave excellent yields (>99%) for all tested waxes, better than those obtained from sulphonation of the same waxes, whose yields were PWA 85% and Pet. W 64%.

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### Prepared medicinal petroleum jelly

Four blends were formulated as follows:

#### *Blend 1*

Imported medicinal white oil  
 Medicinal macrocrystalline wax (acid treated)  
 Medicinal microcrystalline wax (acid treated).

#### *Blend 2*

Medicinal white oil (acid treated technical white oil)  
 Medicinal macrocrystalline wax (acid treated)  
 Medicinal microcrystalline wax (acid treated).

#### *Blend 3*

Imported medicinal white oil  
 Medicinal macrocrystalline wax (hydrotreated)  
 Medicinal microcrystalline wax (hydrotreated).

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**Table 10** Properties of treated petroleum jelly blends and British Pharmacopoeia specifications

<i>Requirement</i>	<i>Blends</i>			
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
<i>Solubility</i> Practically insoluble in water and ethanol; soluble in chloroform, in ether and in petroleum spirit (boiling range 40–60), the solutions sometimes showing a slight opalescence	Insoluble in water and ethanol. Soluble in chloroform and ether	Insoluble in water and ethanol. Soluble in chloroform and ether	Insoluble in water and ethanol. Soluble in chloroform and ether	Insoluble in water and ethanol. Soluble in chloroform and ether
<i>Acidity or alkalinity</i> Boil 5 g with 10 ml of ethanol previously neutralised to litmus solution. The extract is neutral to litmus solution	Neutral	Neutral	Neutral	Neutral
<i>Light absorption</i> Absorbance of a 0.5% w/v solution in isooctane, UV at 290 nm, not more than 0.5	0.002	0.02	0.092	0.062
<i>Melting point</i> From 38–56°C	46	46	51	49
<i>Foreign organic matter</i> Heat 1 g until fumes appear. No acrid odour is evolved	No acrid odour	No acrid odour	No acrid odour	No acrid odour
<i>Sulphated ash</i> Not more than 0.1%	Nil	Nil	Nil	Nil

*Blend 4*

Medicinal white oil (hydrotreated)  
Medicinal macrocrystalline wax (acid treated)  
Medicinal microcrystalline wax (acid treated).

**Table 10** compares the specifications of the formulated blends with British Pharmacopoeia specifications.

Field trials were carried out on the prepared medicinal petroleum jellies obtained by sulphonation (samples 1 and 2), or by hydrogenation (samples 3 and 4). The field trials were

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**Table 11 Prepared jelly blends, British Pharmacopoeia, and field trial results**

<i>Specification</i>	<i>Sample no.</i>	<i>Misr Petr.</i>	<i>Hoechst</i>	<i>Nile</i>	<i>Swiss-pharma</i>	<i>Arab Drug</i>
<i>Solubility</i> Insoluble in water and ethanol; soluble in chloroform, in ether and in petroleum spirit 40–60	1	confirmed	confirmed	confirmed	pass	confirmed
<i>Acidity</i> The extract with neutral ethanol is neutral to litmus solution	1	neutral	confirmed	confirmed	pass	
<i>Light absorbance</i> UV at 290 nm $\leq 0.5$	1	0.002	0.06		0.0176	0.168
<i>Melting point</i> 38–56°C	1	46	45	43	52.5	48
<i>Foreign organic matter</i> No acrid odour	1	confirmed	confirmed	confirmed	pass	confirmed
<i>Sulphated ash</i> $\leq 0.1\%$	1	nil	0.006		nil	
Polycyclic aromatic hydrocarbon	1				confirmed	
<i>Solubility</i> Insoluble in water and ethanol; soluble in chloroform, in ether and in petroleum spirit 40–60	2	confirmed	confirmed	confirmed	pass	confirmed
<i>Acidity</i> The extract with neutral ethanol is neutral to litmus solution	2	neutral	confirmed	confirmed	pass	confirmed
<i>Light absorbance</i> UV at 290 nm $\leq 0.5$	2	0.02	0.087		0.0316	0.268
<i>Melting point</i> 38–56°C	2	46	47	43	52.5	48
<i>Foreign organic matter</i> No acrid odour	2	confirmed		confirmed	pass	confirmed
<i>Sulphated ash</i> $\leq 0.1\%$	2	nil	0.009		nil	
Polycyclic aromatic hydrocarbon	2				confirmed	

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<i>Specification</i>	<i>Sample no.</i>	<i>Misr Petr.</i>	<i>Hoechst</i>	<i>Nile</i>	<i>Swiss-pharma</i>
<i>Solubility</i> Insoluble in water and ethanol; soluble in chloroform, in ether and in petroleum spirit 40–60	3	confirmed	confirmed	confirmed	pass
<i>Acidity</i> The extract with neutral ethanol is neutral to litmus solution	3	neutral	confirmed	confirmed	pass
<i>Light absorbance</i> UV at 290 nm $\leq 0.5$	3	0.092	0.063		0.0287
<i>Melting point</i> 38–56°C	3	51	48	54	54
<i>Foreign organic matter</i> No acrid odour	3	confirmed		confirmed	pass
<i>Sulphated ash</i> $\leq 0.1\%$	3	nil	0.03		nil
Polycyclic aromatic hydrocarbon	3				confirmed
<i>Solubility</i> Insoluble in water and ethanol; soluble in chloroform, in ether and in petroleum spirit 40–60	4	confirmed	confirmed	confirmed	pass
<i>Acidity</i> The extract with neutral ethanol is neutral to litmus solution	4	neutral	confirmed	confirmed	pass
<i>Light absorbance</i> UV at 290 nm $\leq 0.5$	4	0.062	0.032		0.0503
<i>Melting point</i> 38–56°C	4	49	50	55	52.5
<i>Foreign organic matter</i> No acrid odour	4	confirmed	confirmed		pass
<i>Sulphated ash</i> $\leq 0.1\%$	4	nil	0.02		nil
Polycyclic aromatic hydrocarbon	4				confirmed

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carried out at four different national and international pharmaceutical companies according to British Pharmacopoeia 1988 and 1993. These companies were Hoechst Orient S.A., The Nile Company for Pharmaceuticals & Chemical Industries (NCP), The Arab Drug Company, and Swisspharma S.A.

The analysis is summarised in **Table 11**. From this it is clear that all the prepared samples meet the British Pharmacopoeia 1988 and 1993 specifications.

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## CONCLUSION

Medicinal petroleum jelly was prepared using local macro- and microcrystalline waxes after treating these by either sulphonation or hydrogenation. The prepared petroleum jellies meet the British Pharmacopoeia specification (1988 and 1993).

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## References

1. Kosturova, Alica, and Kekenak, Jan, 'Improved production of oil-soluble sulfo acids and white oil from mineral oils', Czech patent CS 239392, 1987.
2. Vybihal, J., *Ropae Uhlie*, **29**, 4 (1987) 192-8.
3. Himmel, W., Anstock, T., Spahl, R., and Kuessner, K., *Erdoel Kohle, Erdgas, Petrochem*, **39**, 9 (1986) 408-14.
4. Nagarajan, R., Proc. 3rd LAWSP Symposium, 1982.
5. Brandes, G., 'Structural groups of petroleum fractions', *Brennst. Chem.*, **37** (1956) 263.