

DETECTION OF ADULTERANTS IN ASAFOETIDA

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ABSTRACT: A method for detection of colophony-resin, abietic acid, gum and free umbelliferone as adulterants in *Asafoetida* by thin-layer chromatography has been discussed. Thin-layer chromatography of the alcoholic extract of *Asafoetida* using n-hexane: chloroform: methanol (50:50:1 vfv) as solvent, followed by exposing in a chamber pre-saturated with iodine vapour, yields the characteristic spots of adulterants.

INTRODUCTION

Asafoetida is an oleo-gum resin obtained from the living rhizome and roots of *Ferula asafoetida*, *F. foetida*, *F. rubricaulis* and probably other species of *Ferula* (umbelliferae)¹. It is official to various pharmacopoeias^{2,3}. In Indian system of medicine, it is a valuable remedy for hysteria and nervous disorders of women and children⁴. In Homocopathy the drug is used in treatment of flatulence, reversed peristalsis, in hysterical and hypochondriacal cases and for syphilitic ulceration with sensitiveness and throbbing pain⁵. Chemical investigations on *F. asafoetida* were reported earlier⁶⁻⁹. Standards prescribed for it so far cover alcohol insoluble matter not more than 50%, ash not more than 15% and absence for free umbelliferon³. However, pure drug is known to contain 65-75% of matter soluble in alcohol (90%) with ash as low as 3-5%¹⁰. On the other side, commercial asafoetida is frequently adulterated with ammonia-cum-gum, resin, wheat flour, slices of potatoes and inorganic substances like gypsum, red clay and chalk¹¹. The present paper is, therefore, concerned to devise a quick and a convenient method for detection of adulterants like ammonia-cum-gum, rosin, abietic acid and umbelliferone.

MATERIALS AND METHODS

Commercial samples of *Asafoetida* (*asafoetida*) were obtained from different markets, their macroscopic characters³ were compared and those passing the identification and limits³ were accepted for further study. Seven such samples were accepted.

Asafoetida 'S': One of the visibly good samples was spread on clean white tile, its greyish-white or yellow tears picked up by fine forceps and labelled 'S'. This served as standard sample for the study on the basis of the following chemical tests:

(1) When this sample boiled for some minutes with hydrochloric acid and the solution made alkaline with ammonia solution and diluted, a blue

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fluorescence is produced. There was no fluorescence in case of adulterated samples.

(2) A reddish-brown solution results when a fragment of this sample is heated with sulphuric acid; on diluting this solution with a large volume of water, filtering and alkalisng the filtrate, a purple-blue fluorescence is produced.

(3) Thoroughly triturate 0.5g with 2g of sand in moderately coarse powder, transfer to a test-tube, add 5ml of alcohol, to which 0.5ml of dilute ammonia solution has been added; no fluorescence results (free umbelliferone).

Abietic acid: It was prepared according to the method described¹². It was recrystallised, m.p. 172° (α)²³ - 116° ($c = 1$ in absolute alcohol).

Umbelliferon: A natural sample was obtained by the distillation of the resin in vacuo. Its purity was established before use; m:p: 225°.

Rosin (colophony): It was yellow rosin of commerce.

T.L.C. plates: Usual T.L.C. plates of silica gel G were employed¹³.

Solvent system: n-hexane: chloroform: methanol (50:50:1 v/v).

Detecting technique: Exposed to iodine vapours.

1g of each of the commercial samples and sample 'S' were dissolved in fluorescent-free 95% alcohol by trituration. On spotting they were labelled A₁, A₂, A₈ and the standard as AS. Following similar method spots for abietic acid, colophony resin and umbelliferone were marked respectively as AA, CR and Umb. Development took place in a suitable chamber which was presaturated with the same solvent system.

After development the plates were dried at approximately 30°. Now the developed plate was exposed to iodine vapours in a closed chamber at the same temperature. The brown spots were marked and R_f tabulated (see Table I on next page).

RESULTS AND DISCUSSION

From the tabulated results it can safely be inferred that Asafetida of commerce is being adulterated to a large extent with other rosins and gums. Of the eight samples in the present study, four were adulterated with abietic acid, six with colophony rosin and one sample was adulterated with umbelliferone. The method is recommended as a quick and convenient method for detection of these adulterants.

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TABLE I
Comparison of T.L.C. results of commercial asafoetida, asafoetida (AS), colophony rosin (CR), abietic acid (AA) and free umbelliferone (UMB.)

S.No.	AA	CR	Umb.	A ₁	A ₂	A ₃	A ₄	A ₅	A ₆	A ₇	A ₈	AS
1.	—	—	.034	—	—	—	—	—	—	—	—	—
2.	—	.055	—	.055	.055	—	.055	—	—	—	—	—
3.	—	0.13	—	0.13	0.13	0.13	0.13	0.13	—	0.13	—	—
4.	—	—	—	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
5.	—	0.22	—	—	—	0.22	0.25	0.22	0.22	—	—	—
6.	—	—	—	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
7.	—	0.44	—	0.44	0.44	0.44	0.44	—	0.44	—	—	—
8.	—	—	—	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
9.	—	—	—	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52
10.	0.56	—	—	—	0.56	0.56	0.56	—	0.56	—	—	—
11.	—	0.91	—	—	0.91	0.91	0.91	0.91	0.91	—	—	—
12.	—	—	—	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
13.	—	0.97	—	0.97	0.97	—	0.97	—	0.97	—	—	—

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