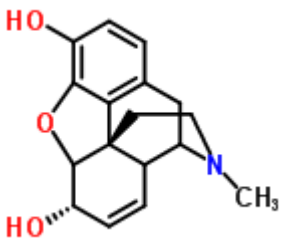
1. MORPHINE

A. Structure, Empirical Formula, Molecular Weight



Morphine
$C_{17}H_{19}NO_3$
MW 285.3

B. Synonyms: NA

C. Trade Names: Duramorph®, MS Contin®, MSIR®, Oramorph SR™, Roxanol™, Kadian®, etc.

D. Drug Action: Narcotic analgesic

E. Common pharmaceutical/street forms: 15-200 mg tablets, 15-100 mg capsules, 2 to 20 mg/mL oral solution, 0.5 to 25 mg/mL injectable solution, 5 to 30 mg rectal suppositories. Morphine is present in opium in concentrations of 9-15%.

F. Solubility:

(1) Free base: Slightly soluble in isopropyl alcohol, ethanol, methanol, and chloroform, insoluble in water, and diethyl ether

(2) Various salts: Water, slightly soluble in ethanol and methanol, insoluble in chloroform and diethyl ether

G. Extraction:

(1) Dry extraction

(a) Determine amount of sample required for extraction based on the concentration of morphine in the sample.

(b) Grind sample and place in spot plate or test tube.

(c) Extract with methanol:isopropyl alcohol (4:1).

(d) Filter to remove any insoluble material if necessary.

(e) Evaporate the extraction solvent and reconstitute in C15 methanol.

(2) Dry extraction

(a) Determine amount of sample required for extraction based on the concentration of morphine in the sample.

(b) Grind sample and place in spot plate or test tube.

(c) Extract with C15 methanol.

(d) Filter to remove any insoluble material if necessary.

(3) Dry extraction for controlled release tablets

(a) Determine amount of sample required for extraction based on the concentration of morphine in the sample.

(b) Ether wash the sample and discard the ether.

(c) Extract the remaining sample with C15 methanol.

(d) Filter to remove any insoluble material if necessary.

(4) Acid/base extraction for samples combined with acetaminophen or aspirin

(a) Determine amount of sample required for extraction based on the concentration of morphine in the sample.

(b) Grind tablet or remove liquid and place in a test tube.

(c) Add 0.2 N sulfuric acid.

(d) Extract with chloroform two times, discarding the chloroform (bottom layer). If emulsions occur, the sample may be centrifuged.

(e) Basify (saturate) the acidic solution with solid potassium carbonate. Verify that the pH is basic.

(f) Extract with chloroform:isopropyl alcohol (4:1). If emulsions occur, the sample may be centrifuged.

(g) Remove the chloroform:isopropyl alcohol layer and place into a clean well.

(h) Repeat steps f and g, combining the chloroform:isopropyl alcohol extracts.

H. Chemical indicator tests:

(1) Marquis: Purple

(2) Liebermann's: Brown-black

(3) Froehde's: Purple

(4) Mecke's: Green

I. TLC:

(1) Mobile Phase:

(a) System 1: Chloroform:methanol (90:10)

(b) System 2: Methanol:conc. ammonium hydroxide (100:1.5)

(2) Locator: Acidified iodoplatinate, Dragendorff reagent, Marquis reagent

J. GC/MS: Analyze using "Drugs1" program.

K. Comments: Used for pain relief.

L. Report as: Morphine, a narcotic drug.

M. References:

(1) Analytical Profiles of Narcotic Analgesics, CND Analytical, Inc., Auburn, AL, 1991.