Parkland College

Natural Sciences Poster Sessions | Student Works

2014

Focalin XR: Dexmethylphenidate Hydrochloride

Andrea L. Sullivan
Parkland College

Recommended Citation
Sullivan, Andrea L., "Focalin XR: Dexmethylphenidate Hydrochloride" (2014). *Natural Sciences Poster Sessions*. 74.
https://spark.parkland.edu/nsps/74

Open access to this Poster is brought to you by Parkland College's institutional repository, SPARK: Scholarship at Parkland. For more information, please contact spark@parkland.edu.

What does the drug do? 1.

Works on the cerebral cortex with a mild stimulant effect. Causes mild CNS and respiratory stimulation with potency between amphetamines and caffeine. Effects more prominent on mental activities than on motor activities.
Also suppresses appetite.

Generic Name: 1.

Dexmethylphenidate Hydrochloride

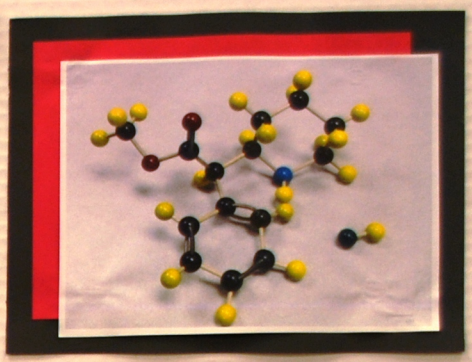
Trade Names:

Focalin XR, Concerta, Daytrana, Metadate CD, Metadate ER, Methylin, Methylin ER, Ritalin, Ritalin LA, Ritalin SR

Chemical Names and Formula: 2.

d-threo-Form (αR, 2R)-α-Phenyl-2-piperdine-acetic acid methyl ester; dexmethylphenidate d-threo-Form hydrochloride, dexmethyphenidate hydrochloride

$C_{14}H_{19}NO_2 \cdot HCl$

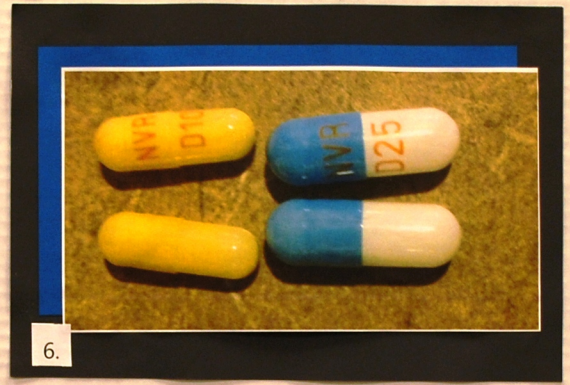


How is the drug taken? 1.

Orally, swallowed whole, 30-45 min before meals and before 6 pm to avoid insomnia. Some of the capsules can be sprinkled on food. Absorbed by the GI tract, peak effect in 1.9 hours. Effects continue for 3-6 hours. In sustained release, 8 hours. Also available in a transdermal patch.

Classification: 1.

Cerebral stimulant



6.

Dosing: 1.

For extended release (XR),
20-40 mg daily taken by mouth before breakfast,
up to a maximum of 72 mg per day.
For regular release,
5-10 mg by mouth before breakfast and lunch, with gradual increase of 5-10 mg per week, as needed, up to a maximum of 72 mg per day.

How is the drug metabolized? 2. 4.

Metabolized primarily to d-α-phenyl-piperidine acetic acid (also known as d-ritalinic acid) by de-esterification (removing ester groups from it). For all forms, the body eliminates the drug in urine.

Uses: 1. 2.

Used in adjunctive therapy to treat symptoms of attention deficit disorder in children and adults.
Also used to treat narcolepsy and in veterinary medicine to treat canine behavioral problems.
Unlabeled use to treat depression

Calculation of Molar Mass:

Element	MM	#	Total
Carbon	12.0 g/mole	14	168.00 g/mole
Hydrogen	1.0 g/mole	19	19.0 g/mole
Nitrogen	14.0 g/ mole	1	1.0 g/mole
Oxygen	16.0 g/mole	2	32.0 g/mole
Chlorine	35.5 g/mole	1	35.5 g/mole
MM of dexmethylphenidate			269.5 g/mole

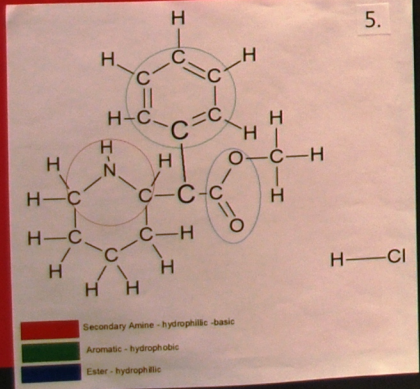
Literature value for MM: 2. 269.77 g/mole

Chosen dosage: 5 mg

Availability: 1.

- Tablets: 5 mg, 10 mg, 20 mg
- Chewable tablets: 2.5 mg, 5 mg, 10 mg
- Oral solution: 5mg/5ml, 10 mg/5 ml
- Sustained release capsules: 10 mg, 20 mg, 30 mg, 40 mg, 50 mg, 60 mg
- Sustained release tablets: 10 mg, 18 mg, 20 mg, 27 mg, 36 mg, 54 mg
- Transdermal patch: 10 mg, 15 mg, 20 mg, 30 mg

5.



References:

1. Wilson, B. A., Shannon, M. T., & Shields, K. M. (2013). Methylphenidate Hydrochloride. In *Pearson Nurse's Drug Guide 2013* (pp. 969-971). Upper Saddle River, NJ: Pearson Education, Inc.
2. (2013). Methylphenidate Hydrochloride. In O'Neil, M. J., Heckelman, P. E., Dobbelaar, P.H., & Roman, K. J. (Eds.) *The Merck Index: An Encyclopedia of Chemicals, Drugs and Biologicals* (p. 1132-1133). Cambridge, UK: Royal Society of Chemistry.
3. DrugBank. (2014, October 19). *Dexmethylphenidate.* Retrieved from http://www.drugbank.ca/drugs/DB06701
4. U.S. National Library of Medicine. (2013). FOCALIN XR-dexmethylphenidate hydrochloride capsule, extended release: Pharmacokinetics. *Daily Med.* Retrieved from http://dailymed.nlm.nih.gov/dailymed/druginfo.cfm?setid=1a1da905-42a0-4748-9c39-67eca45deccc
5. (2014). Organic Chemistry. In Drake, S.A. (Ed.) *Chemistry 106 Classroom Supplement Fall 2013 Revision* (pp. 162-171). Champaign, IL: Stipes Publishing L. L. C.
6. Sullivan, A. (2014). *Dexmethylphenidate hydrochloride.* Champaign, IL.

Andrea Sullivan Parkland College
CHE106-04

Water solubility: 3.

1.82 e-01 g/L (insoluble)
However, according to all sources, dexmethylphenidate hydrochloride is freely soluble, but a solubility figure on dexmethylphenidate **with** hydrochloride does not seem to be available. HCl is polar (and thus water soluble) so it is possible that the addition of the HCl makes dexmethylphenidate hydrochloride soluble.

Molecules per chosen dose: 2.

X molecules of $C_{14}H_{19}NO_2 \cdot HCl$ =

$$\frac{5\text{ mg } C_{14}H_{19}NO_2 \cdot HCl}{1000\text{ mg } C_{14}H_{19}NO_2 \cdot HCl} \left| \frac{1\text{ g } C_{14}H_{19}NO_2 \cdot HCl}{269.77\text{ g } C_{14}H_{19}NO_2 \cdot HCl} \right| \frac{1\text{ mole } C_{14}H_{19}NO_2 \cdot HCl}{1\text{ mole } C_{14}H_{19}NO_2 \cdot HCl}$$

$$\frac{6.02 \times 10^{23}\text{ molecules } C_{14}H_{19}NO_2 \cdot HCl}{1\text{ mole } C_{14}H_{19}NO_2 \cdot HCl} =$$

1.115765282 x 10^19 molecules of $C_{14}H_{19}NO_2 \cdot HCl$

Rounded to 1 sig fig = 1 x 10^19 molecules of $C_{14}H_{19}NO_2 \cdot HCl$

$$\text{X tablets} = \frac{5\text{ mg } C_{14}H_{19}NO_2 \cdot HCl}{5\text{ mg } C_{14}H_{19}NO_2 \cdot HCl} \left| \frac{1\text{ tablet } C_{14}H_{19}NO_2 \cdot HCl}{1\text{ tablet } C_{14}H_{19}NO_2 \cdot HCl} \right| = 1\text{ tablet}$$