

Table 1

Substances on the WHO Model List of Essential Medicines (EML)

Medicine^a	Highest oral strength according to WHO Essential Medicines List^a	Solubility^b	Permeability^c	BCS class^d	Dissolution test (for biowaiver)^e	Potential risks^f	Indication(s) according to WHO Essential Medicines List^a	Comments and special dosage form indications^a
abacavir	200 mg	high	low	3	9.2.1.2		antiretroviral	
acetazolamide	250 mg	low	low (?)	4/2	Not eligible for biowaiver		antiglaucoma medicine	unknown whether poor BA is due to poor solubility or poor solubility and poor permeability
acetylsalicylic acid	500 mg	high	high	1	9.2.1.1		NSAID, anti-migraine medicine	
acetylsalicylic acid	100 mg	high	high	1	9.2.1.1		antithrombotic medicine	
aciclovir	200 mg	high	low	3	9.2.1.2		antih herpes medicines	
albendazole	400 mg	low	low (?)	4/2	Not eligible for biowaiver		anthelmintic	chewable tablet; unknown whether poor BA is due to poor solubility or poor solubility and poor permeability
allopurinol	100 mg	high	high	1	9.2.1.1		gout	
aluminium hydroxide	500 mg			NR	NA		antacid	used for local effect

NSAID, Non-steroidal anti-inflammatory drug; BA, bioavailability.

amiloride hydrochloride	5 mg	high	high	high	1	9.2.1.1		diuretic	
amitriptyline hydrochloride	25 mg (†)	high	high	high	1	9.2.1.1		psychotherapeutic medicine	
amlodipine	5 mg	high	high	high	1	9.2.1.1		antihypertensive medicine	
amodiaquine (base)	200 mg	high	borderline BA > 75%		3/1	9.2.1.2	CYP2C8 polymorphism, increased risk for agranulocytosis and liver toxicity	antimalarial	extent of first-pass metabolism uncertain
amoxicillin (a) + clavulanic acid (c)	(a) 500 mg + (c) 125 mg	(a) high + (c) high	(a) high + (c) borderline absorption >73% (radioactive excretion)	(a) 1 + (c) 3/1		9.2.1.2		antibacterial	combination should be tested according to clavulanic acid requirements
amoxicillin anhydrous	500 mg	high	high	1		9.2.1.1		antibacterial	
artemether (a) + lumefantrine (l)	(a) 20 mg + (l) 120 mg	(a and l) unknown	low (a and l)	(a) 4/3 + (l) 4/3		Not eligible for bio waiver		antimalarial	
ascorbic acid	50 mg	high	high	1		9.2.1.1		vitamin	
atenolol	100 mg	high	low	3		9.2.1.2		antianginal, antihypertensive, antiarrhythmic medicine and used in heart failure	

BA, bioavailability.

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azithromycin	500 mg	low	low (?)	4/2	Not eligible for biowaiver		antibacterial	unknown whether poor BA is due to poor solubility <i>or</i> poor solubility <i>and</i> poor permeability
benznidazole	100 mg	high	low	3	9.2.1.2		American trypanosomiasis	
biperiden hydrochloride	2 mg	high	insufficient literature	3/1	9.2.1.2		antiparkinson medicine	
carbamazepine	200 mg	low (neutral)	high	2	Not eligible for biowaiver		antiepileptic, psychotherapeutic medicine	scored tablet
cefixime	400 mg	low	low (?)	4/2	Not eligible for biowaiver		antibacterial	unknown whether poor BA is due to poor solubility <i>or</i> poor solubility <i>and</i> poor permeability
chloramphenicol	250 mg	high	low	3	9.2.1.2	narrow therapeutic index	antibacterial	
chloroquine phosphate or sulfate	150 mg	high	high	1	9.2.1.1		DMARD, antimalarial	

BA, bioavailability; DMRD, disease modifying antirheumatic drug.

chlorphenamine hydrogenn maleate	4 mg	high	BA 25-59%, first pass	3/1	9.2.1.2	CYP2D6 polymorphism	antiallergic	extent of first-pass metabolism uncertain
chlorthalidone	100 mg	high	low	3	9.2.1.2		psychotherapeutic medicine	
ciprofloxacin hydrochloride	250 mg	high	BA 70–82%, possible first pass, high in Caco-2 cells	3/1	9.2.1.2		antibacterial	extent of first-pass metabolism uncertain
clofazimine	100 mg	insufficient literature	low	4/3	Not eligible for biowaiver at present		antileprosy medicine	
clomifene citrate	50 mg	high	insufficient literature	3/1	9.2.1.2		ovulation inducer	
clomipramine hydrochloride	25 mg	high	66% excreted in the urine, the remainder being eliminated in the faeces	3/1	9.2.1.2		psychotherapeutic medicine	lack of absolute bioavailability data
cloxacillin (as sodium salt)	1000 mg	high	low	3	9.2.1.2		antibacterial	
codeine phosphate	30 mg	high	low	3	9.2.1.2	risk of abuse	opioid analgesic, diarrhoea in adults	
dapsone	100 mg	low (weak base)	high	2	Not eligible for biowaiver	G6PD deficiency	antileprosy medicine	
diazepam	5 mg	high	high	1	9.2.1.1		psychotherapeutic medicine	scored tablet

BA, Bioavailability; G6PD, glucose-6-phosphate dehydrogenase.

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didanosine	200 mg	high	low	3	9.2.1.2		antiretroviral	buffered chewable, dispersible tablet
didanosine	400 mg	high	low	3	see comment		antiretroviral	unbuffered enteric coated capsule → not eligible for biowaiver in this dosage form ^l
digoxin	250 µg	high	high	1	9.2.1.1		antiarrhythmic and used in heart failure	
diloxanide furoate	500 mg	low (2)	low (?)	4/2	Not eligible for biowaiver		antiprotozoal	unknown whether poor BA is due to poor solubility or poor solubility and poor permeability
doxycycline hydrochloride	100 mg	high	high	1	9.2.1.1		antibacterial	
efavirenz	200 mg	low (1)	low (?)	4/2	Not eligible for biowaiver		antiretroviral	unknown whether poor BA is due to poor solubility or poor solubility and poor permeability
enalapril	2.5 mg	high	low	3	9.2.1.2		antihypertensive medicine	

BA, Bioavailability.

ergocalciferol	1.25 mg (50 000 IU)	high	low	3	9.2.1.2		vitamin	
erythromycin stearate + ethylsuccinate	250 mg	low	low	4	Not eligible for biowaiver		antibacterial	
ethambutol hydrochloride	400 mg	high	low	3	9.2.1.2	risk of dose-re- lated ototoxicity	antituberculosis medicine	
ethinylestradiol	50 µg	high	borderline, BA 40–50%, first pass	3/1	9.2.1.2		estrogen	extent of first- pass metabolism uncertain
ethinylestradiol (e) + levonorg- estrel (l)	30 µg + 150 µg	high	(e) borderline, BA 40–50%, first pass + (l) high	3/1 + 1	9.2.1.2		hormonal contraceptive	extent of first-pass metabolism un- certain; combina- tion should be tested according to ethinylestradiol requirements
ethinylestradiol (e) + norethis- terone (n)	35 µg + 1 mg	high	(e) borderline, BA 40–50%, first pass + (n) high	3/1 + 1	9.2.1.2		hormonal contraceptive	extent of first-pass metabolism un- certain; combination should be tested according to ethinylestradiol requirements
ferrous salt	equivalent to 60 mg iron	high (see footnote)	low	3	9.2.1.2		antianaemia medicine	commonly used salts: see footnote

BA, Bioavailability; GI, gastrointestinal.

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ferrous salt (fs) + folic acid (fa)	equivalent to 60 mg iron + 400 µg folic acid	(fs) high + (fa) high	(fs) low + (fa) low (urinary recovery 28.5%) (2)	3 + 3/1	9.2.1.2		antianaemia medicine (during pregnancy)	lack of absolute bioavailability data; commonly used salts: see footnote; combination should be tested according to ferrous salt requirements
fluconazole	50 mg	high	high	1	9.2.1.1		antifungal	
folic acid	5 mg	high	low (?)	3/1	9.2.1.2		antianaemia medicine	lack of absolute bioavailability data
furosemide	40 mg	low	low (?)	4/2	Not eligible for biowaiver	highly variable BA	medicine used in heart failure; diuretic	unknown whether poor BA is due to poor solubility or poor solubility and poor permeability
glibenclamide	5 mg	low	low (?)	4/2	Not eligible for biowaiver		antidiabetic agent	unknown whether poor BA is due to poor solubility or poor solubility and poor permeability

NSAID, Non-steroidal anti-inflammatory drugs; GI, gastrointestinal.

glyceryl trinitrate	500 µg	high	sublingual application, permeability in the oral cavity more important than GI permeability	3/1	NA ^h	local absorption	antianginal medicine	sublingual application
griseofulvin	250 mg	low (neutral)	high	2	Not eligible for biowaiver		antifungal	
haloperidol	2 mg	borderline < 0.01 mg/ml ²	low	4/3	Not eligible for biowaiver		psychotherapeutic medicine	
hydralazine hydrochloride	50 mg	high	low	3	9.2.1.2		antihypertensive medicine	
hydrochlorothiazide	25 mg	high	low	3	9.2.1.2		antihypertensive medicine, diuretic and used in heart failure	scored tablet
ibuprofen	400 mg	low, weak acid (pK _a 4.4, 5.2)	high	2	9.2.1.3		NSAID, anti-inflammatory medicine	
indinavir sulfate	400 mg	low	low (?)	4/2	Not eligible for biowaiver	CYP 450 3A4, food effect (-)	antiretroviral	unknown whether poor BA is due to poor solubility or poor solubility and poor permeability

D:S, Dose:solubility ratio; BA, bioavailability.

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iopanoic acid	500 mg	low, weak acid (pK _a 4.8) (2)	high	2	Not eligible for biowaiver		radiocontrast media	Insufficiently soluble in water (15 µg/ml) to be eligible for biowaiver
isoniazid	300 mg	high	borderline	3/1	9.2.1.2		antituberculosis medicine	
isoniazid (i) + ethambutol (e)	(i) 150 mg + (e) 400 mg	(i) high + (e) high	(i) borderline + (e) low	(i) 3/1 + (e) 3	See footnote ^g	ocular toxicity	antituberculosis medicine	
isosorbide dinitrate	5 mg	high	sublingual application, permeability in the oral cavity more important than GI permeability	3/1	NA ^h		antianginal medicine	sublingual
ivermectin	6 mg	practically insoluble in water ³ D:S > 6000 ml	low (?)	4/2	Not eligible for biowaiver		antifilarial	scored tablet; unknown whether poor BA is due to poor solubility <i>or</i> poor solubility <u>and</u> poor permeability
lamivudine	150 mg	high	high	1	9.2.1.1		antiretroviral	

BA, bioavailability; GI, gastrointestinal; D:S, Dose: solubility ratio.