

GLOSSARY OF ABBREVIATIONS USED IN PETROGRAPHIC DESCRIPTIONS

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The following are often obvious, but for the record customary abbreviations are explained here, with some additional notes on procedures. This system was evolved for detailed, standardised descriptions (Turnstone numbered descriptions, #401 onwards). Summaries of all descriptions (over 3,500) are stored in the **PETSUM** database, and complete descriptions (#976 on) are created in the related **PETDAT**. Textural and summary sections are written "in full", but shorthand forms are generally retained for detailed information on each mineral. These descriptions are a central feature of many of >460 Turnstone reports. An earlier (1986), Spanish -annotated edition of this glossary is available: two relevant works in Spanish are: Anon (1981), Williams *et al.* (1968). Plutonic rock nomenclature generally follows the modal classification of Streckeisen (1976), summarized in Hyndman (1972, pp.31-41). See also Le Maitre *et al.* (1989) and Sharma (1992).

Colour

bl	blue
brn	brown
grn	green
or	orange
yl	yellow

General

anh	anhedral
assoc	associated
balsam	mounting medium: balsam or glue of similar RI.
DDH	diamond drill hole (drill core samples). Sizes: X-Ray (19.0 mm, 0.75"), A/AQ (27.0 mm, 1.06"), ATW (30.3 mm, 1.195"), B/BQ (36.5 mm, 1.44"), BTW (B, Thin Wall: 42.0 mm, 1.654"), N/NQ (47.6 mm, 1.875"), NTW (56 mm, 2.205"), NQ2 (59 mm, 2.32"), H9 (63.5 mm, 2.50"), HQ (63.0 mm, 2.48") and PQ (84.8 mm / 3.34").
dia	diameter
EDS	energy-dispersive spectrometry (of EPM)
eff in HCl	effervescence in (cold) dilute (10%) hydrochloric acid
EPM	electron microprobe analysis
esp	especially
euh	euhedral
HS	hand specimen
magnetism	magnetic samples, rich in ore minerals such as mag and magnetic pyrr, noted in HS descriptions. An abundance of these phases yields an extremely magnetic rock, in which an offcut slice (say 45x25x5 mm) of the rock can be lifted with a small magnet. The findings can be quantified by systematic use of a magnetic susceptibility meter (an SM-30 has been employed since 2006).

max/min	maximum/minimum
mesh size	examples of ASTM mesh sizes; 8 (2.36 mm), 10 (2.0 mm), 18 (1.0 mm), 20 (850 µm), 35 (500 µm), 60 (250 µm), 80 (180 µm), 200 (75 µm) and 400 (38 µm).
PIXE	Proton-induced x-ray emission (proton microprobe)
PGE	Platinum Group Elements (Os, Ir, Ru, Rh, Pt and Pd)
PGM	Platinum Group Minerals (major proportions of one or more PGE)
rel	relatively (or optical "relief", discontinued)
staining	K-feld staining involves the HF-sodium cobaltinitrate test (Sclar and Fahey, 1972) leaving a bright yellow stain on the feldspar. For carbonate staining a variety of methods can distinguish, e.g., calcite, dolomite, ankerite and magnesite..See Friedman (1959), Wolf <i>et al.</i> (1967) and Hutchison (1974).
symm	symmetric(ally)
tr	trace
WDS	wavelength-dispersive spectrometry (of EPM)

Grainsize

dia	diameter
gs	grain size - NB: section orientation influences apparent size of tabular and acicular minerals (<i>cf.</i> micas and tourmalines).
...fgr	fine-grained
...mgr	medium-grained
...(v)cgr	(very) coarse-grained
mm	1 mm=0.03937 inch
µm	1 micron=0.001 mm

Minerals (74 species and groups of minerals: see also Fleischer and Mandarino, 1991)

ab	albite	
act	actinolite	
amph	amphibole	
an	anorthite	
and	andradite	- Ca-Fe garnet, in context
anth	anthophyllite	
ap	apatite	
asp	arsenopyrite	
aug	augite	
bi	biotite	
cal	calcite	
carb	carbonate	
chalc	chalcopyrite	
chl	chlorite	
chr	chromite	
clzo	clinozoisite	
cord	cordierite	
cpx	clinopyroxene	
ctoid	chloritoid	
cumm	cummingtonite	
di	diopside	- Mg-Ca cpx
dol	dolomite	
en	enstatite	
epi	epidote	

fa	fayalite	- Fe olivine
fo	forsterite	- Mg olivine
foid	feldspathoid	- sodalite, nepheline, etc
fstilp	ferrostilpnomelane	
gal	galena	
gar	garnet	- common end-members: pyrope, almandine, spessartine, uvarovite, grossularite and andradite
go	goethite	
gro	grossularite	- Al-Ca garnet
grp	graphite	
hb	hornblende	
hed	hedenbergite	- Fe-Ca cpx
hem	hematite	
hyp	hypersthene	
ilm	ilmenite	
joh	johannsenite	- Mn cpx
kaol	kaolinite	
K-feld	alkali feldspars	- Orthoclase, microcline, perthite, sanidine, adularia
ky	kyanite	
lim	limonite	
ma	marialite	- sodic scapolite ($\delta=0.009$)
mag	magnetite	
marc	marcasite	
me	meionite	- calcic scapolite ($\delta=0.036$)
moly	molybdenite	
musc	muscovite	
neph	nepheline	
of	orthoferrosilite	- pyroxene Fe-rich endmember
oliv	olivine	
opx	orthopyroxene	
pent	pentlandite	
phlog	phlogopite	
plag	plagioclase feldspar	
px	pyroxene	
py	pyrite	
pyrr	pyrrhotite	
qz	quartz	
rieb	riebeckite	
rut	rutile	
ser	sericite	
serp	serpentine	
sill	sillimanite	
sphal	sphalerite	
sphen	sphene	- more properly, titanite
staur	staurolite	
stilp	stilpnomelane	
tour	tourmaline	- common varieties are schorl, dravite and elbaite
ves	vesuvianite	- alias idocrase
woll	wollastonite	- (may be abbreviated to "Wo", e.g., $\text{En}_{75}\text{Of}_{10}\text{Wo}_{15}$)
zir	zircon	
zo	zoisite	

Miscellaneous

C-A	Carlsbad-Albite twinning in plagioclase
QAM	Quartz- Ankerite- Mariposite rock (distinctive green alteration assemblage, as in the Mother Lode: also known as "listwanite")
QAP	Quartz - Alkali-feldspar - Plagioclase estimated modes in a rock, normalized to 100% (see Streckeisen, 1976).
QFP	Quartz-Feldspar-Porphyry

Mode

A rough visual estimate. Accessory phases <1% are annotated "Tr." (trace): subdivisions are "Abundant tr." and "Rare tr.". An attempt is made to counteract the common tendency to overestimate the frequency of the dark phases. Minerals are described in order of decreasing modal abundance.

Optical Properties

aniso	anisotropic/anisotropy
bir	birefringence - relative retardation is often written in shorthand, e.g., 1st-o yl = first-order yellow. Maximum birefringence is estimated from thickness (calculated from colours of dependable minerals, such as quartz) and the highest-order colours seen.
birf	bireflectance
ext	extinction. May be "str" (straight, parallel to length) or "clean", wherein the whole grain goes dark at once, c.f. strained quartz.
int	interference
LF/LS	orientation: length fast/slow
MEA	Maximum Extinction Angle (degrees) in the Michel-Levy test of plagioclase composition. Where possible, at least six suitable grains are used. MEA is also used for other minerals. For intermediate -calcic plagioclase, note that the M-L test often gives results which are rather more sodic than the the actual composition, as determined by either the Carlsbad-Albite (C-A) test or by EPM (seldom noted, but see Finn, 1981). If both are available, a C-A number is generally preferred to a M-L value. In the case of albite and oligoclase below An ₂₀ , unless a perfectly oriented section is found, the estimate may be too calcic. This is unlikely to be a major obstacle in interpretation, although in one case plag estimated at An ₈ (M-L test) and An ₅ (C-A test) was found by EPM to be An ₁ , nearly pure albite.
PH	polishing hardness: see Uytendogaardt and Burke (1971, pp.17-21)
Pleo	pleochroism
PPL	plane polarized light
refl	reflectance
RI	refractive index
RL	reflected light
"RL"	obliquely-incident light, sometimes employed on CTS
ST	sensitive tint plate (orientation and optic sign work)
TL	transmitted light
XP	cross-polarized light. In RL either polarizer or analyser is often offset (rotated) a few degrees in order to emphasise anisotropy / bireflectance. Some properties (pleochroism and relief), are described relative to the orientation of the polarizer (the "vibration plane of the lower nicol" is equivalent to the polarizer).

Ore Microscopy

See Craig and Vaughan (1981) or Spry and Gedlinske (1987), which each contain descriptions of about 100 opaque minerals. Properties such as scratch and polishing hardness, bireflectance and reflection pleochroism are also briefly discussed (Craig and Vaughan, 1981, pp.36-43). Descriptions of ore minerals are also listed in Uytenbogaardt and Burke (1971), Ineson (1989) and the classic work of Ramdohr (1980).

Photomicrographs and Figures

Colour	Photomicrographs were made by either (a) using daylight- balanced colour film and a blue filter, or (b) using film balanced for tungsten lighting, without a blue filter. Photos taken in RL may thus have bluish-grey backgrounds (method (a)) or brownish backgrounds (method (b), mostly in early descriptions). Intermediate colour renditions can be achieved with daylight film, and no blue filter. Slide film was used for maximum flexibility and quality control, with high rejection rates. Since June 2005, digital photomicrography has been used, with a Motic camera and (July 2010) a Progres C3 camera by Jenoptik.
FOV	Field of view in mm (long axis of photo): the primary scale indicator, as magnification (for a given FOV) is dependent on equipment used. FOV is approximate: quoted FOV may sometimes be reduced from that of the original by extra enlargement and/or cropping of the print.

Sample Format

CTS	covered thin section, nominal thickness 30 μm .
(D)PTS(C)	(doubly-) polished thin section (C= circular, in 25 mm diameter form for reflected light and microprobe work: many rectangular PTS are also microprobe- compatible). For high-current ion beam analyses, such glass-backed mounts have been prepared with a thickness of $\geq 500 \mu\text{m}$: "ThPTS(C)", now generally supplanted by the PRS methods noted below.
PM	polished mount, for reflected light microscopy, also microprobe- compatible unless qualified. Generally circular, ~ 10 mm thick.
PRS	polished rock slice, often an offcut of PTS preparation (see below).
Thickness	of CTS and PTS, gauged by interference colour of quartz or other phases. Excludes slide margins, which may taper somewhat.

Sections (including the glass backing slide) are ~ 1 mm thick: normal CTS and PTS are $\sim 46 \times 27$ mm in plan. Large sections (75x50 mm) are especially useful for structural geology, often with oriented samples. In the case of PM ("ore mounts") it is probably better to prepare smaller mounts than the older samples commonly found in teaching and museum collections. While some of these (e.g., 30 mm wide and 18 mm deep) may fit into electron microscope sample chambers, maximum compatibility with microprobe systems is achieved with circular mounts 25 mm wide and (say) 10 mm thick. Modern PM are mostly 25 mm in diameter, but larger (40 mm) PM may be useful for examining large volumes of mill products. Most of the volume is usually the epoxy mounting medium: the sample can be a few sub-mm grains, mm-scale flakes or drill chips, or a rock slice up to 25 mm wide and a few mm thick.

Special Formats include grain mounts, which typically contain 20 or more mineral grains or metal shards. These may be used especially for EPM/PIXE of diamond indicator minerals such as garnets (the PM format can also be used). A novel mount is a polished offcut (PRS), ideally the complement of a PTS, used in Accelerator Mass Spectrometry for ultra-trace element analysis (e.g., detection levels of parts per billion for gold and PGE). In this technique, "minicores" 4 mm in diameter are often drilled from a number of PRS, and mounted in sets of 12 in a 25-mm aluminium mount, suitable for a full range of in-situ microanalytical techniques (EPM, PIXE, AMS, etc).

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N.B. These are 37 items in the **MINLIB** annotated Earth-science bibliography, from many sources, updated into 2010 with some **80,000 records**: 14,500 on *petrography*, 10,100 on *mafic-ultramafic rocks*, 4,400 on *hydrothermal alteration* and 3,000 for *ore textures*: 2,200 pertain to *industrial minerals*: 5,500 to *PGE* and 16,000 to *gold*, 6,400 on *meteorites*, with geographic highlights such as North America (Canada, 21,900: Grenville province, 2,900), Latin America (7,900), Indian subcontinent (7,600). Ask about other capabilities of this powerful research tool, the **17,000-item WORLD** database, and other developments in field- and lab-based Earth science at **Turnstone**. See also: <http://www.turnstone.ca/petworks.htm>.