



WORLD'S BEST PRACTICE & FORTUITOUS FACTS ABOUT OXIDE PIGMENT COLOURS USED IN 'THROUGH-COLOURED', PREMIXED CONCRETE & MORTARS

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DID YOU KNOW. . . ?

1. That **all** brands of oxide dry colourants (mineral **oxide** powder pigments) are insoluble and do **not** dissolve (like sugar or salt in water) when used to colour materials – including wet ('plastic') concrete, mortar and grout mixes.
2. That for uniform colouration of maximum intensity, oxide colouring pigments **must** be *thoroughly* mixed and *dispersed* in the material being coloured. The tiny **ultra-fine**, sub-micron solid particle grains should be *uniformly* and discretely distributed in a concrete/mortar mix (or in rubbers, plastics, paints, asphalt etc) by **adequate** dispersive mixing.

For good 'through-coloured' pre-mixed concrete we suggest a mixing time of ten (10) **minutes** at the ideal barrel **mixing** speed (20 rpm) of a typical pre-mixed concrete transit truck after the pigment has been added. This ten (10) minute mixing time will ensure adequate dispersion of the pigment particle grains which in turn **ensures colour uniformity and its maximum colour development.**

Please note that at the slow 'agitator' speed of a transit mixer the concrete is not being mixed!

3. That **all** good brands of colouring oxides are **ultra-tiny** coloured grains of solid mineral material - either man made

(synthetic) or natural from the earth (hence the description 'earth colours').

4. The preferred, better quality synthetic oxide types – depending on their particular colour are about 700 to 1000 times finer in particle size than cement particles.
5. That a heaped tablespoon of a good quality synthetic oxide colourant such as Ability's '**abilox**[®]' or any one of many **other** manufacturers world-wide, typically contain over *one billion* non-reactive (inert) ultra-fine insoluble particles.
6. **Most** '**abilox**[®]' pigments (Ability offer fifty (50) different standard colours in the '**abilox**[®]' range and all are immediately available ex-stock) give **ideal** colouring strength or staining power at about an 8-9% dose rate by weight of the cement or total cementitious binder weight in concrete.

This dose rate equates to approximately one (1) 25kg bag or two (2) 12.5kg bags of '**abilox**[®]' per cubic metre of Grade N25 pre-mixed concrete.

In some cases with the use of those '**abilox**[®]' colouring pigments that give the strongest colouring result (such as '**abilox**[®] Black Iron Oxide CAF-X2), lower dose rates may be suitable.

7. That **all** brands and types of inorganic mineral oxide colouring pigments **are** exceptionally UV resistant but some inferior varieties may **not** be uniform in colour from batch to batch, may also be very dull in shade, difficult to disperse or they may not be of satisfactory colouring strength for a particular colouring purpose in relationship to their cost).
8. Ability Building Chemicals Co prides itself on producing colouring pigments that are not only colourfast but are of the highest technical quality. This means that each 'abilox®' pigment is highly uniform in its colouration potential from batch to batch and bag to bag, collectively are all easy-to-disperse, have high colouring strength and give the best cost effectiveness.
9. When used in concrete or mortar mixes to permanently colour them, oxide cement pigments are **only** actually mixed into the cement paste 'glue'. The sand (fine aggregate) and 'metal' or pebbles (coarse aggregate) are **not** coloured or pigmented.
10. At a temperature below 180°C, all 'abilox®' colouring pigments are resistant to colour change in concrete potentially caused by steam curing or with moisture under pressure (autoclave curing) although if lower than ideal pigment dose rates are used (typically below 4%), the final **overall** concrete colour may be different (usually *lighter* in colour shade) as a result of this concrete curing process when compared with other methods of efficient hardening by adopting the procedure of curing. [See item (D) on page 3]
11. That if the hydrated (hardened) cement 'glue' in hardened concrete is of a poor, weak, non-durable quality and is worn away by traffic or is eroded away by running water and weathering, that the oxide pigment particles (**all** brands) as well as the sand/fine aggregate **are eroded or worn away with it** to reveal the coarse aggregate. These occurrences therefore **reduce** the colouring effect obtained from pigments added into concrete.
12. That the cement 'glue' at the surface of set concrete or mortar may suffer from leached **white salt bloom** (*efflorescence*) or a **weak surface layer** of light coloured cement scum called *laitance*. Both are usually caused by the use of **too much** water in relation to the cement content **or ineffective** curing or **both** [*curing* of concrete or

mortar means a mix water retention (holding) procedure which is important and should be beneficially adopted **immediately** after concrete sets, for at least 7 days and preferably 28 days]-. As a result, the ultra-tiny, colourfast colour particles of pigment at the surface are partly or totally hidden from sight by these white or pale coloured surface layers.

13. That these occurrences at the surface 'dilute' the colouring effect of colouring pigments to a viewer's eye to give the **impression** of fading.
14. That the pigment grains have **not** faded due to these occurrences. They are 'masked' or hidden by the **efflorescent** white salt bloom and/or the light coloured **laitance at only the surface of the concrete or mortar**.

Therefore, for a successful, permanent integrally coloured (or a uniform grey unpigmented) mortar or concrete job, at the surface (as well as underneath) it is important to make sure that the cement 'glue' reaches its full strength and remains as a tough, durable, hard and long-lasting material as is possible.

THIS TOUGHNESS, DURABILITY, HARDNESS & LONGEVITY OF THE CEMENT 'GLUE' CAN BE ACHIEVED BY:

- (a) Buying quality pre-mixed concrete from a reputable supplier. For instance, an CC & AA (Cement, Concrete & Aggregates Pre-Mixed Concrete Division) supplier could be considered.

Concrete should always have an **adequate cementitious binder content** as represented by its strength grade or class. For general paving we recommend quality pre-mixed concrete of a minimum compressive strength grade of N25 (25MPa compressive strength at 28 days) and **preferably** the higher N32 (32MPa compressive strength at 28 days) grade.

or

If mixing a **mortar** for rendering or brick/block laying on the building site (concrete without the coarse aggregate) **do** mix it **very** well ie **very** thoroughly (for a suitably longer time than concrete) with the **least** amount of water possible, and **do** use an **adequate** amount of cement in it.

(b) **ORDER & USE PLASTIC (WET) PRE-MIXED CONCRETE & MORTARS AT THE LOWEST POSSIBLE SLUMP:**

We strongly recommend the addition of Ability's 'EFFLOREIN®' Mark 2 powder admixture for concrete* at the recommended dose rate to prepared normal grades of pre-mixed plastic concrete having about 20% (1/5) less water to give a liquid consistency of only a **40mm slump** and then re-mixing the concrete for ten (10) minutes at the transit mixer's **mixing** barrel speed to result in highly workable, easily placed and handled concrete having about an 80mm slump.

This **lower** water content for a final 'convenient-to-place' and finish concrete consistency together with the adoption of the seven (7) day procedure of mix water retention *immediately* after setting (curing) by the concreter will help to result in hardened concrete having the **highest** strength for the concrete strength grade ordered **without loss** to result in excellent long term durability.

(c) **Compacting wet concrete after its placement** by a suitable vibration procedure such as with poker vibrators after it is placed to efficiently **compact it!** This process **gets rid** of air voids in the plastic concrete mix to ensure that the resultant hardened concrete is densified and when hardened will have become as **dense and hard** as possible and that with the adoption of an efficient procedure of curing, the strength grade of

concrete ordered *is* achieved in place and not lowered by the entrapment of air bubbles and voids. **The denser the binding cement 'glue' or matrix the stronger** the concrete. The **STRONGER** the concrete, the longer it will last. The longer it lasts the longer the **oxide colouring pigment grains** in barrel mixed coloured concrete are held and bound together to make it **colourfast**.

(d) **CURING THE CONCRETE:**

Continuous curing means adopting a suitable procedure *immediately* after the concrete sets to **'hold' the mix water in** by preventing it from evaporating - for at least a month. One of the easiest and most practical ways to do this is to immediately broom-coat or spray the **freshly set** concrete or mortar with Ability's '**Duro-Seel**' clear film-forming curing compound coating or a similar good quality liquid concrete **curing compound** - on the **same** day as concrete placement **IMMEDIATELY** after it has set. This means a liberal application of the 'Duro-Seel' to the surface of the finished concrete immediately after the occurrence of the setting which for 32N grade concrete occurs in about 3½ hours at a temperature of 23°C after the concrete is mixed.

NOTE: If concrete or mortar is not cured by this curing procedure it can lose up to 50% of its mechanical strengths, weathering resistance and abrasion (wear) resistance!

**CURED CONCRETE IS RESULTS IN STRONG, DURABLE CONCRETE.
STRONG, DURABLE COLOURED CONCRETE IS COLOURFAST!**

Good concrete is made by using a **low** water content in relationship to the cement or cementitious binder content (preferably no more than 50% water to 100% cement) **and** adopting a procedure to keep that water **in** by preventing it from evaporating – for 7 days and preferably for a period of 28 days.

Good coloured concrete is made in exactly the same way!

For further **free** recommendations to assist **you** with the **effective** use of 'abilox®' colourants contact:

**PETER GRAY OR MICHAEL TREACY NOW AT
ABILITY BUILDING CHEMICALS CO**

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* **NOTE:** In addition to these recommended *good* practices and processes for the placing, handling and site processing of pre-mixed concrete - either coloured or uncoloured, outlined above, Ability offers their multi-functional concrete admixture product 'EFFLOREIN®' Mark 2 powder. 'EFFLOREIN®' Mark 2 is intended for use with either coloured or uncoloured concrete and mortars.

When added to a prepared **low** slump (less flowable consistency) plastic (wet) concrete or mortar mix, having a consistency represented by about a 40mm slump, and **re-mixed thoroughly**, 'EFFLOREIN®' Mark 2 **increases the wet concrete consistency** to a normal slump of about 80mm *without the addition of further water* and brightens colours through better dispersion of the pigments in a given mixing or pigment dispersing time.

'EFFLOREIN®' Mark 2 makes concrete pumping and shotcreting much easier and it lowers or inhibits bleeding (water 'bleeding' to the surface of freshly placed wet concrete) - thereby making it easier and quicker to finish and preventing the formation of laitance. It also very effectively waterproofs concrete and controls the occurrence of efflorescence (white salt bloom) occurring on exposed surfaces of concrete or mortar. Please ask for further information and/or a free no charge trial production size sample of 'EFFLOREIN®' Mark 2 for your evaluation.



MARK 2