

# THE SCIENCE PRINCIPLES OF “DYE” PENETRANT’S “BUILDING”

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## ABSTRACT

In science literature are known a lot of “dye” penetrant’s compositions. As a rule they differs each from other by the type of the dye. The first desire during new penetrant’s “building” is to choose the dye with bright colour and success will be provided. But the real picture is not so simple. The main part of industrial dyes are intended for cloth’s, hair’s and so on painting in necessary colour. Thus dye is used as a constructional material. In the case of “dye” penetrant testing we don’t paint the controlled surface for a long time. The next operation is cleaning of the surface from dye. Thus the penetrant is better if it doesn’t paint the controlled construction. From the other side penetrant must very active interacts with the surface to have the best penetrate properties. Such contradictions make penetrant’s “building” a very complicated task.

We suggested a new approach to “dye” penetrant’s elaboration, which include the optimization penetrant’s properties by the dye with special chemical structure. Synthesis of the dye allows to influence almost on all main properties of the penetrant:

- spectroscopic characteristic and consequently the sensitivity of capillar control;
- the faculty to penetrate into defects. The decisive influence on this property depends on the solvent’s nature. And one of the main tasks of penetrant’s “building” is the dye’s modification to combine it with different solvents;
- adhesion of the dye to the controlled surface, which too depends on it’s chemical structure. The adhesion lowering permits to increase the quality of surface’s cleaning and to use the water wash technology;
- toxic and ecologic safety.

After use of such approach we elaborate the dye, which possess a complex need properties:

- bright raspberry colour;
- extinction coefficient near 50000;
- simply washed by water;
- solve in different solvents in high concentration.
- one of the main advantages of the dye is the full absence of any harm and ecological cleanliness of the dye because it’s synthesized from medicine raw materials.

Complex decision of the task allowed us to “build” the set of dye penetrants for different branches of industry and energetic. For control of welding in vessels on nuclear power stallions and ships we suggest the nontoxic penetrant on water base, for NDT of airspace and aviation constructions - penetrant on kerosene and lubricants, for aerosol products – on alcohol and so on. Among this set there are “dye” penetrants with the record sensitivity of control – defects with the breadth about 0,5 mkm can be detected. All of them are certificated and standardized in Ukraine and produced by state enterprise “KOLORAN” of National Academy of Science of Ukraine.