04-8  Typical application of TVS modelling to two natural materials from Brenta’s alluvional plan (Italy) for mudtherapy and cosmetic characterization

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Introduction: Mineralogical, granulometrical and chemical investigations of Brenta’s silt-clay confirmed its common origin with natural Euganean Thermal Muds (ETM)1) opening perspectives in the treatment of inflammatory pathologies as rheumatic diseases. Basing on these evidences, surface energy investigations of Brenta’s silt-clay and ETM by TVS modelling were considered within correlation studies between physic-chemical and tensiometric data.

Objectives: Basing on Brenta’s silt-clay and ETM common origin, the aim of this work was to confirm the suitability of Brenta’s silt-clay in thermal field by comparative analyses of their matrices and on these basis hypothesize the potentialities of Brenta’s silt-clay in mudtherapy and cosmetic field.

Materials and Methods: Brenta’s silt-clay (BrentaKerô) samples and ETM were collected respectively from EGAP’s gravel pit and Euganean thermal spa’s maturation plant, undergone at maturation process employing thermal water at different temperature, investigated using (a) DSA10-Kruss tensiometer (diiodomethane, PFPE, glycerine as liquid tests) for surface energy characterization, and (b) Perkin Elmer TOC Analyser for C (%) and H (%) detection. Tensiometric characterizations were performed by measurement of contact angles (deg) of different liquid tests converted successively in surface energy (mN/m) by Owens mathematical model 2).

Contact angles of PFPE were performed by Perfluoropolyether Contact Angle Measurement Method (PCAM).

Results: Correlation degree between dispersed surface energy component (DC) of Brenta’s silt-clay and contact angles of PFPE (deg) measured during 6 weeks of maturation resulted satisfactory (R2=0.90). Considering the typical maturation’s temperature measured from third week to sixth (40°C t3, 41°C t4, 42°C t5, 43°C t6), the correlation degree between them and values of DC (mN/m) of Brenta’s silt-clay (DCt3=18.9 mN/m, DCt4=20.3 mN/m, DCt5=19.9 mN/m, DCt6=20.6 mN/m) resulted maximal (R2=1). Brenta silt-clay and ETM DC levels (DCt3=21.2 mN/m, DCt4=20.4 mN/m, DCt5=20.9 mN/m, DCt6=20.7 mN/m) demonstrated optimally correlated (R2=0.97). TOC analyses performed on Brenta’s silt-clay and ETM after maturation showed an increase of C% respectively +1.4% and +4.3% and percentage loss of H of –37.8% and –10.7% with an increase of DC and PC of +17.8 mN/m and +21.0 mN/m confirming the great affinity between the two geomaterials. Regarding ETM it demonstrated also the capability to deliver DC (-44.8%) uptaking PC (+50%) during mudtherapy as result of the modification of
selective permeability of skin.

**Conclusions:** Chemical-mineralogical analyses, tensiometric investigations, and studies of correlations between Brenta's silt-clay and ETM demonstrated a great affinity between them. Surface energy evaluations of ETM, its capability to deliver DC to skin uptaking PC during mudtherapy modifying skin's selective permeability and favouring the permeation of therapeutic substances produced during maturation process, suggest new perspectives for the employment of Brenta's silt-clay in thermal field as anti-inflammatory agent for rheumatic diseases and in cosmetic sector.

**Keywords:** TVS modelling, TOC, Exchange activity, Skin interface, PFPE (Fomblin HC/25)

**Bibliography**
